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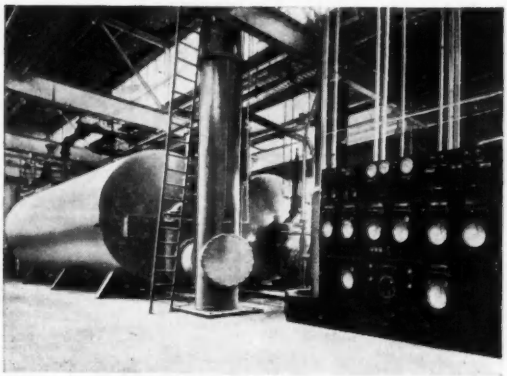

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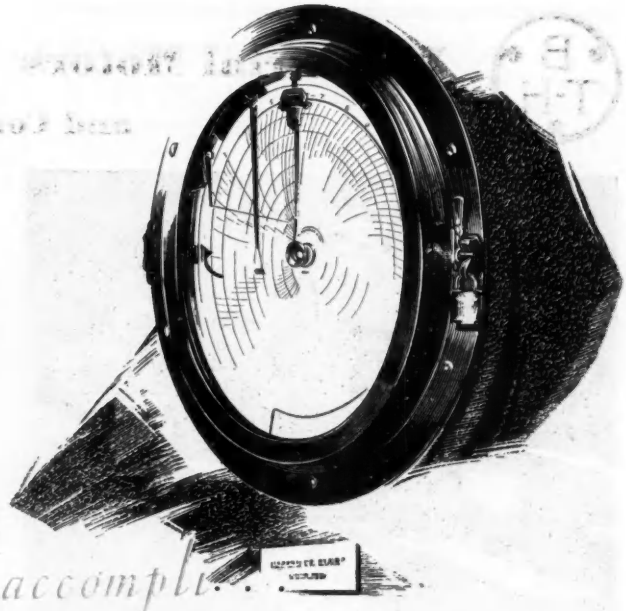

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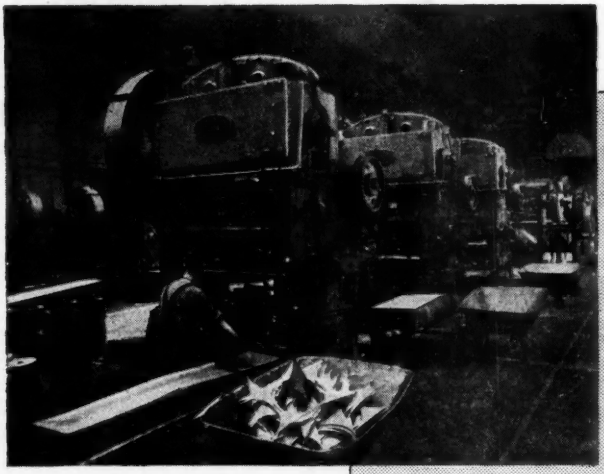

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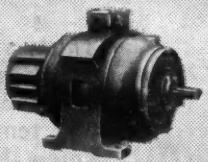
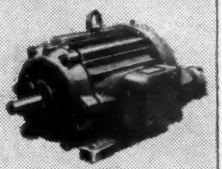
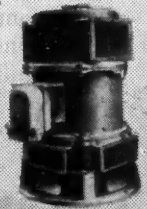


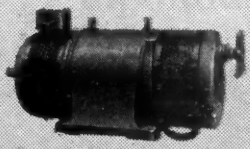
A.C. slip-ring drip-proof motor.



T.E. fan-cooled squirrel-cage flameproof motor.



Vertical spindle slip-ring induction motor



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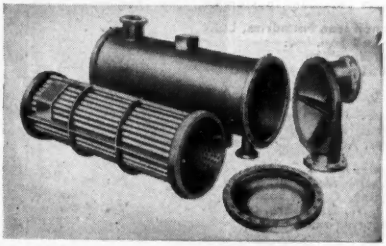

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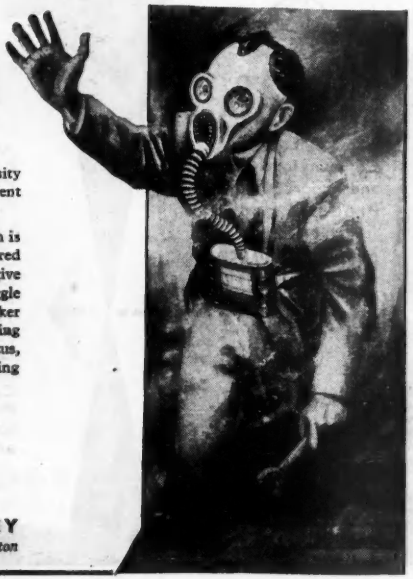

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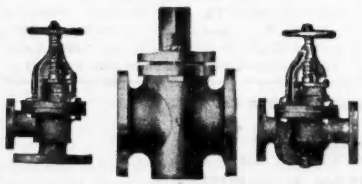
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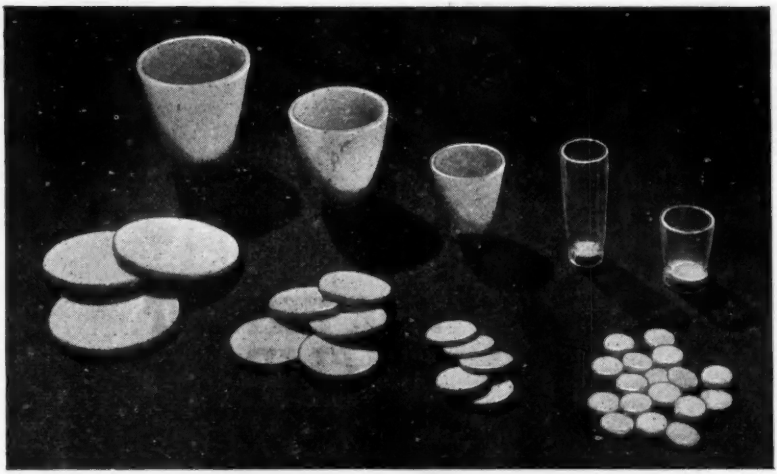

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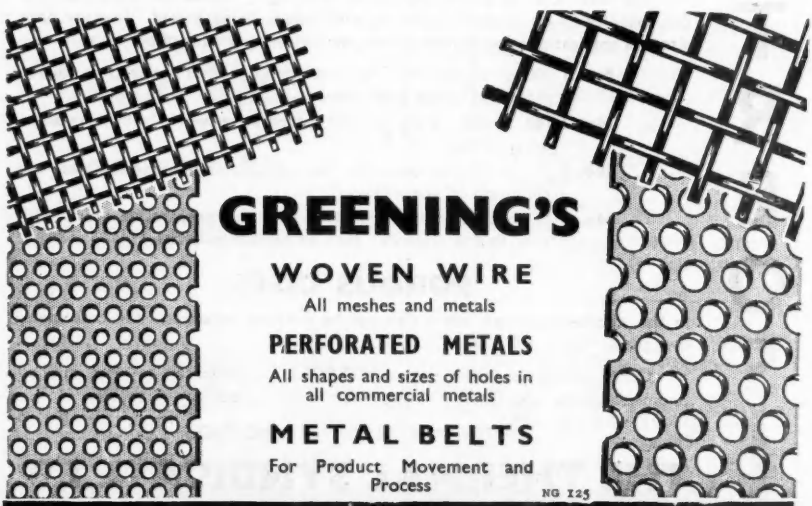

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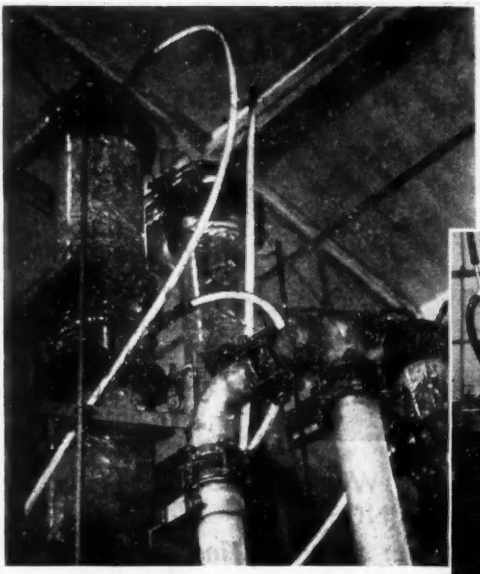

Left
Section of Hydrochloric Acid Absorption Towers. (*Photo. by courtesy of I.C.I.*)

Below
Assembly of Utility Set for Reaction and Distillation in vacuo.

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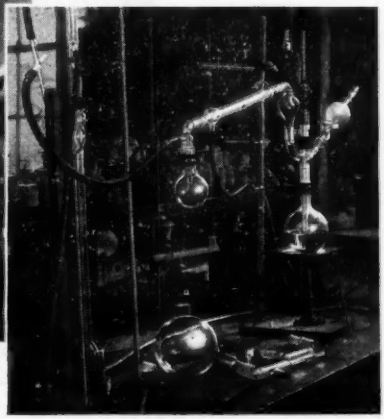

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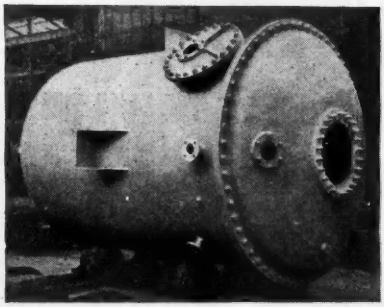

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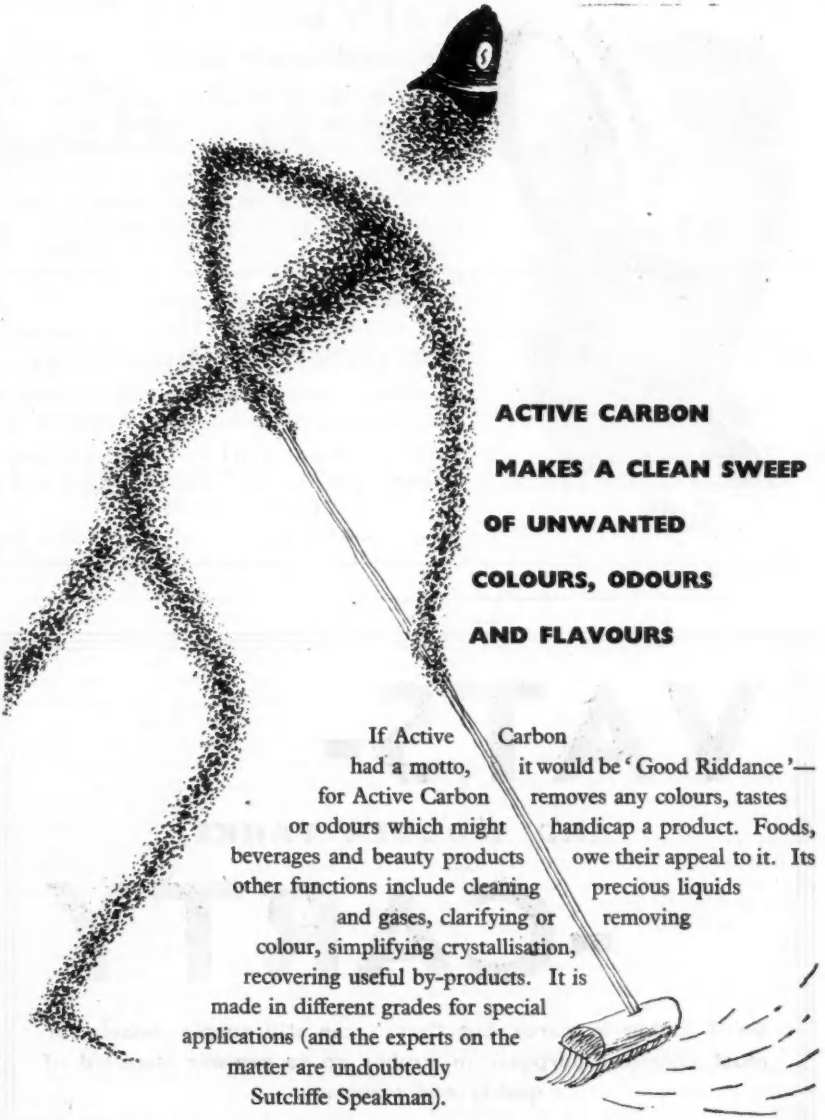

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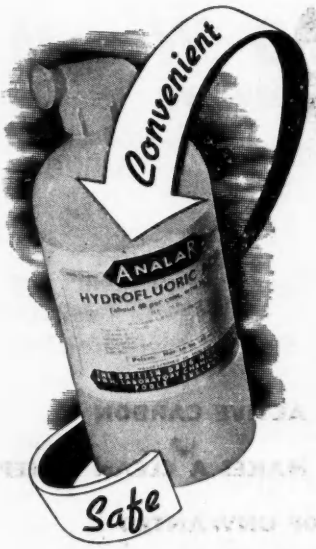

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The Weekly Journal of Chemical Engineering and Industrial Chemistry

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'Chemistry. . Key to Better Living'

IT is strange to recall that the turmoil of riots in Birmingham in the 18th century were indirectly the cause of the foundation of what is the largest chemical society in the world. Following the confiscation of his laboratory, Joseph Priestley in August of 1794 travelled to Northumberland, Pennsylvania, to visit his sons, who had gone out there a year or so before, and decided to settle there himself as it was a peaceful and pleasant place to continue his writings and experiments. It was at his house that the idea of forming a society exclusively for chemists originated when a gathering of chemists was assembled in 1874 to attend the centennial celebration of Priestley's discovery of oxygen. Two years later, on the evening of 6 April, 1876, in the lecture room of New York's University College of Pharmacy, a pioneering band of 35 chemists decided that action should take the place of discussion, and by a simple show of hands the American Chemical Society came into being. Those few founders, although doubtless having faith and confidence in their project, would no doubt have been amazed on that soft spring evening in the dignified atmosphere of Washington Square if they could have foreseen that in 75 years their society would have about 66,000 members, 20 scientific and technical divisions, 139 local sections, and five principal publications. More than 16,000 of its members are chemical engineers.

Objects of the American Chemical Society may briefly be stated to be the encouragement in the broadest and most liberal manner of the advancement of chemistry in all its branches; promotion of research in chemical science and industry; improvement of the qualifications and usefulness of chemists through high standards of professional ethics, education, and attainments; and the increase and diffusion of chemical knowledge. That these have been successfully achieved is beyond doubt from the high esteem, and one might almost say affection, with which the ACS is deservedly regarded throughout the world today. For many years the chemist, if considered at all, was regarded as a queer fish, whereas today chemistry is a most respectable and respected profession. The chemist and chemical engineer are held in high regard for their intellectual as well as practical achievements and their influence on everyday life is far more appreciated. In bringing about this transition of opinion the ACS has played no small part by its continual endeavours

to interest the laymen in chemistry.

The Diamond Jubilee of the society (for while in England 60 years is generally accepted under this designation, in America it is universally recognised as 75 years), has been marked by a special issue of *The Chemical and Engineering News*, which contains a great fund of interesting information, articles and pictures about the ACS.

One of the society's greatest attributes is probably its wide diversity, the strong support of its divisional activities being a sign of the keen interest of its members in the advancement of their science and profession. The divisions are most unequal, in membership and also in scope, but each plays its own important rôle. Industrial and engineering chemistry, organic chemistry, physical and inorganic chemistry, to mention three of the first-formed divisions are, of course, huge subjects. Sugar chemistry and cellulose chemistry are more limited in scope, but quite large enough to require one man's full attention. Rubber and petroleum each attract many members. On the other end of the scale is the division devoted to the History of Chemistry. While its members are fewer and have a specialised interest, they are far from being non-productive. The past of chemistry is indeed well worth studying, offering as it often does, a signpost to the future.

To try to enumerate a list of even some of the noted members of the ACS would only be invidious, while to mention all would be impossible. Nevertheless, two men, who are great personalities in American chemistry, must be mentioned for they have, for over half a century, been intimately connected with the society and will play a prominent part at its Diamond Jubilee celebrations next month. They are Dr. Charles Lathrop Parsons, former secretary, and Dr. Marston T. Bogert, twice president, who will be honorary co-chairmen of the 75th anniversary meeting. Dr. Parsons will unveil a bronze plaque marking the site where the society held its first meeting 75 years ago, and two days later Dr. Bogert, on behalf of the ACS, will acknowledge the greetings of delegates from technical societies all over the world. Throughout their careers these two have worked as a team, with the welfare of the American Chemical Society always to the forefront of their aims and ideals.

In a message to the Society, its president, N. Howell Furman, quotes its present slogan, 'Chemistry . . . Key to Better Living,' and states that there is every reason to believe this will be justified in many ways during the next quarter of a century. Chemistry can play a significant part in the establishment of peaceful co-operation among nations.

Future success is invariably linked to a better product, and a better product depends on the quality of its ingredients. If the quality of its 'ingredients' or members remains as high as in the past —and there is no doubt that it will—the American Chemical Society may well face with confidence the next quarter of a century—or for that matter the next century. In the meantime, chemists from all parts of the globe will unite in sending their congratulations to the society, combined with hearty good wishes for its future success and prosperity.

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Notes & Comments

Comrade Stalin, D.Sc.

TWO sets of Hungarian technical abstracts which have recently come to hand make it abundantly clear that capitalist bourgeois hypocrisy is still playing its decadent part in the scientific workings of the Western world. The first abstract, entitled 'The Organisation of Hungarian Documentation', tells the story of a Government decree designed to annihilate the anarchy (and probably the librarian) which previously reigned in the field of documentation under capitalism. Evidently documentation is being reorganised under expected lines—trade literature, results and experiences gathered in the Soviet Union as well as the People's Democracies are, says the abstract, of a decisive importance. The rest are not. On the scientific side, much work appears to have been done on a variety of subjects without noticeably infringing the party line. A new method for determining nitrate, reductive condensation of ketone aldehydes, the role of carotene in agriculture, and many other papers besides are mentioned. A new mineral discovered at Felsobanya consisting of manganese, magnesium and zinc sulphate, is, perhaps appropriately, pink in colour (it is similar to minerals of the epsomite group), but it is surprising that Portland cement, mentioned in the next abstract, is allowed to retain its highly anti-proletarian name. The report of the first Stakhanovite (shockworker's) Congress in Buda-Pest is also abstracted. Professor Comrade Bardin, President of the Soviet Academy of Sciences, addressed the conference, and 'painted a vivid picture of the progressive work carried on in the Soviet Union, which endeavours to unite workers and scientists, and abolish the difference between the physical and intellectual workers! Vive la Camaraderie!

Science News

AS a valuable contribution to informed discussion and knowledge about science and scientific matters in all their varied ramifications, the series of Penguin books entitled 'Science News' that comes out periodically could hardly be bettered. Articles written by many authors about many subjects cover an immense range of material authoritatively and in a fascinating manner. No one can be expected to be on intimate terms with more than two of the subjects in any one issue, and it is just this that in issue 21, for example, now published, leads the reader on from his own particular field or interest to those outside it. Thus, while 'The Present Concept of the Physical World' is but remotely connected with 'Identical Twins in Dairy Cattle', it is hard to resist peeping at either, and once the pages are opened, the rest follows. It is a fair bet that nowhere else in literature (except, possibly, in the agglomerated papers of scientific societies, whom nobody in their senses thinks of reading right through) can a man interested in, say, anaesthesia, turn the last page and find an eminently readable article on the origin of language, or the shape of inorganic molecules. The excellence of the book is due in no small measure, we feel, to Mr. A. W. Haslett, the editor, who admits in his editorial that he finds there is a pressure towards parochialism in the choice of authors that is hard to resist. Things are easier in the case of the most accessible authors, more articles are offered, discussion and adjustment are easier, and the search for wider contributions suffer. Mr. Haslett, however, resists it admirably, and at the same time makes no attempt, wisely, to classify, to summarise, or to present his material as anything but what it is, a varied and interesting collection of informed essays on scientific subjects. The series makes a fine contribution to mutual understanding. Besides this, it's very interesting to read.

Achievement

JUST over two years ago work was begun in a stretch of virgin forest land at the edge of the New Forest on the construction of what will be the largest single oil refinery in Europe. At the beginning of next month the Prime Minister will officially open at Fawley this vast new refinery of

the Esso Petroleum Company, which will go 'on stream' several months ahead of schedule. That such an achievement was possible in these days of raw material shortages and other problems is a tribute to the energy and resource of all concerned and to the careful planning and administration. To avoid delays some equipment was ordered six months before the final approval of the project, so that at no time was any part of the work delayed because equipment was not available. The Government co-operated by giving the refinery all priority in the allocation of materials, and the British equipment used often came through in advance of requirements. One of the main problems was to obtain a sufficient number of welders, and to overcome this a school was established in Fawley, from which, after a few weeks, trainees were able to go direct to work on the site. Some 70 U.S. engineers carried out the main planning, but most of the labour force of about 4,000 was recruited in the United Kingdom, and over 80 per cent came from local resources. Here indeed is an example of what can be attained both by international and local co-operation and all, from the highest executive to the last trainee, may feel justifiably proud of their share in the realisation of this £37½ million project in so short a time.

Stanlow Refinery to Manufacture Sulphur

IT has been announced that Shell is to manufacture sulphur and sulphuric acid at its Stanlow (Cheshire) refinery. A sulphur recovery plant will convert hydrogen sulphide to elemental sulphur and eventually it is hoped that the refinery will be able to manufacture all of its own sulphuric acid from the sulphur recovered. The sulphur plant will have an annual capacity of 10,000 tons and the sulphuric acid plant, 5,000 tons.

The cracking of hydrocarbons always results in the production of some by-product hydrogen sulphide and when the cracking stock contains a large amount of sulphur, the amount of hydrogen sulphide so produced is substantial. Accordingly, when Stanlow Refinery's extensions for the processing of Middle East crude were planned, it was decided to install facilities for converting this by-product hydrogen sulphide to elemental sulphur. Sulphur itself is used only to a limited extent but sulphuric acid is used extensively in the refining of oils and in petro-chemical manufacturing operations; accordingly, a logical plan would be to build a sulphuric acid plant to produce Stanlow's own sulphuric acid, consuming as much as is needed of its own by-product sulphur. This is the long-range plan at Stanlow; however, in view of the critical shortage of sulphur, the Stanlow plant has been modified in order to assist the overall economy of the U.K. in providing maximum sulphur during the period of sulphur shortage.

The sulphur recovery plant will recover 10,000 tons per annum from the hydrogen sulphide derived from the cracking of Middle East crudes. In addition an acid plant is being installed to convert waste sulphuric acid sludge to fresh acid. The acid plant is designed to take in 5,000 tons of Shell's own produced sulphur concurrently with the sludge acid, and the resultant total production of sulphuric acid can fulfil all Stanlow's acid requirements including those for synthetic chemicals, etc.

However, as long as elemental sulphur continues in short supply in the U.K., this sulphur can be released to domestic users. To facilitate the release of elemental sulphur, Shell's acid requirements will, so far as possible, be obtained from outside sources.

The total cost of these projects is estimated at between £500,000 and £600,000, and essentially all the equipment used in their construction will be of British manufacture. Both the sulphur recovery plant and the acid plant while conventional in principle, have many modifications which make them the most modern plants of their kind. The sulphur recovery plant will commence operation at the end of this year concurrently with the initial operation of the catalytic cracking plant. The acid plant will be commissioned in the latter half of 1952.

Trace Metals in Biology

Polarographic Methods of Analysis—Part II

IN a previous article on the estimation of trace metals in biological materials by means of polarograph (*see* CHEMICAL AGE, 18 August, 1951), the method described for analysis was by the removal of the desired constituent and the subsequent analysis of the sample after ashing, extraction, electro-deposition, co-precipitation or ion-exchange resins. The present article deals with direct and indirect methods of analysis.

Indirect Determination

In this procedure the metal is caused to react with an organic reagent which is itself capable of producing a polarographic wave. The metal is thus removed as an insoluble complex and the amount is determined by the decrease in the diffusion current of the organic reagent. In this way magnesium has been determined in tobacco and pine seedlings by Stone and Furman[15].

8-Hydroxyquinoline is used as the reagent and gives two waves, at -1.39 v and -1.6 v (vs. S.C.E.) respectively in a buffer solution of NH_4OH and NH_4Cl, of *p*H 10. The first wave is suitable for measurement purposes as it is unaffected by concentration. The Mg complex is very insoluble (1.9×10^{-6} moles per litre), so that the determination of micro amounts of Mg is possible, and the authors claim that the method is well suited to measuring 5 to 200 micrograms of Mg.

In practice the material is dry ashed and the residue is taken up in dilute HCl. The unwanted metals are then mostly removed by electrolysis in a Melaven cell, thus removing all but Ca, Al and Ti; Mn is formed as a precipitate of MnO_2 which is removed by filtration. Addition of ammonium tartrate prevents interference by Al, and the Ti, if present, is precipitated under these conditions. The Ca does not affect the subsequent polarogram.

A similar application has been published by Carruthers[16] for copper using salicylaldoxime as the organic reagent. The oxime gives two waves ($E_{\frac{1}{2}} = -0.54$ and -0.98) and the second one is suitable for measurement in a buffer solution of *p*H between 3.7 and 5.4. Amounts of copper between 3.8 and 38 micrograms have been estimated in this way, but little data has been given for the accuracy of the method. The presence of considerable amounts of Na, K, Mg, Cu, and Fe does not affect the estimation. Comparatively little use seems to have been made of this type of procedure.

In this connection, the determination of sodium should be mentioned, although here an organic reagent is not used[17]. Instead, the triple acetate of sodium, zinc and uranium is precipitated and determined in HCl solution. Remembering that 23 grams of sodium will form 1,634 grams of the triple acetate—an increase of some 71.1 times (15 micrograms of Na produce over 1 milligram of the triple salt), the amount of precipitate produced from micro amounts of sodium is of manageable amount without elaborate techniques.

Molybdenum, too, has been estimated as the α-benzoin complex by a similar method, though here the polarograph has little advantage over the somewhat simpler colorimetric Molybdenum Blue test.

Direct Estimation

Any method which will cut down the time and amount of manipulation will immediately recommend itself. With the possibility of the simultaneous estimation of several metal ions, the polarographic method should be capable of further development in this direction. The ideal procedure is one in which by simple addition of reagents, the solution is ready for polarographic measurements. This ideal is seldom reached, though the method for determining antimony in urine or blood developed by Goodwin and Page[18] approaches it. This method merely involves the addition of HCl for urine, or refluxing with HCl for ½ hour with blood. The solution will then give a wave for trivalent antimony with $E_{\frac{1}{2}}$ of -0.15v. in 1.5N HCl. For total antimony the solution is reduced by the addition of a little sodium sulphite and boiling. The method is used to study the excretion of antimony after treatment with antimonial drugs such as stibophen, tartar emetic, stibacetin, anthiomaline, etc. The results agree well with those obtained colorimetrically by the Rhodgmine B test, but the test is more rapid.

More usually, however, there are difficulties which are not easily overcome. Iron produces special difficulties which have already been discussed, and makes zinc in particular difficult to estimate. Also, alkaline solutions tend to precipitate iron and other metals, especially if phosphates are present, with loss by adsorption, also discussed. Such difficulties limit the range of suitable working conditions.

New Procedure Rapid

The determination of lead in foodstuffs is frequently necessary, and a recent procedure by Jones and Brasher[19] is rapid. The foodstuff is wet ashed by H_2SO_4 + HNO_3 with the addition of $HClO_4$, and heated until fumes of SO_3 are evolved. After cooling and diluting $NH_2OH.HCl$ is added to reduce the iron to the ferrous condition (Fe^{++} has $E_{\frac{1}{2}} = -1.2$, which is considerably more negative than Pb^{++}). Interference by Sn^{++} is avoided by adjustment of the solution to *p*H 2.5 to 3.0. This is achieved by using bromo-phenol blue and thymol blue as indicators and then adding NaOH to a violet colour. The solution on polarographing gives a wave for Pb at $E_{\frac{1}{2}} = 0.5$v. (vs S.C.E.) Results have been published for canned meats and fish products. Addition of tin to 115 p.p.m. did not affect the accuracy of the lead determination which varied from 5 to 41 p.p.m.

An application involving the simultaneous estimation of three metals, Cu, Pb, and Zn, in edible gelatin, has been described by Maron and Michel[20]. The material is ashed at 450°C. and the ash taken up in dilute HCl. The *p*H is adjusted with KOH to 2.5-3.9, using thymol blue as indicator, and the solution polarographed.

Three waves are obtained with $E_{\frac{1}{2}}$ values Cu −0.15v., Pb −0.4v. and Zn −1.0v. If much calcium phosphate is present in the original gelatin a precipitate may form at this *p*H and it is then necessary to adjust it to 2.0 to retain the calcium in solution. It is then just possible to obtain the zinc wave just before the final sweep due to the hydrogen ion, but the determination is less accurate than at the higher *p*H. This method is more rapid than that recommended in BSI 757, 1944, which involves a long co-precipitation method. Results are quoted for 4 p.p.m. of Pb, 8 p.p.m. of Cu and 8 p.p.m. of Zn, which are below the present statutory limits[21] for these metals in edible gelatin. These are Pb −10 p.p.m., Cu −30 p.p.m., and Zn −100 p.p.m.

Inevitably a good deal of the above discourse has been on chemical procedures which precede the actual polarographic measurements, but a few words may usefully be said on the scope of the method itself.

The upper and lower limits of applicability of the polarograph are 10^{-2} molar per litre (accuracy ± 1 per cent) and 10^{-5} molar per litre (accuracy ± 5 per cent). If the molarity, or, more correctly, the gram ion weight for the metal is taken as 100 (Li = 6.94, U = 238) then this corresponds to limits of 1 milligram per ml. to 1 microgram per ml. Assuming that 5 grams of starting material are used and that a final volume of 5 ml. of solution are obtained, then we can determine 5 micrograms in 5 ml., the 1 p.p.m. is measurable. This then sets the lower limit for solid materials unless a larger sample is available and convenient. With liquids, where pretreatment is usually easier, the limit may be as low as 0.11 p.p.m.

For quantities of metals greater than 10 p.p.m. it is probable that amperometric methods could be applied. A number of these are now available[22] and the accuracy of such methods is better than straightforward polarographic measurement at the same concentration. So far, however, they do not appear to have found application in this field.

Comparison Not Easy

Comparison of results obtained with the polarograph, spectrograph, and spectrophotometer is not easy in view of the paucity of data, but a few general observations may be made. For single determinations a number of rapid colorimetric methods have been devised. For example, lead, unaccompanied by any interfering metal can be determined with dithizone by a titration procedure which is very simple and rapid. On the other hand, if it is required to determine several constituents the procedure becomes more elaborate and time-consuming. Spectrographic methods involve the construction of calibration curves for trace amounts and are only advantageous where the samples are of a routine character.

Measuring instruments are usually expensive items of equipment, and this applies particularly to the spectrograph. While it is true that excellent photographic recording and pen recording instruments are now available, most of the measurements in polarography can be made with very simple

equipment, of which the most expensive item is the galvanometer. A simple polarising unit, such as that described by Stock[22] combined with an ordinary 'spot' galvanometer, will meet all the requirements for the experiments described in this article.

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Scientific Film Congress

Committee Seeks Co-operation for Exhibit

SINCE the advance details about the 5th Congress of the International Film Association which is to be held at the Hague from 15-22 September, were sent out earlier in the year, further information has been received about the many active preparations which are being made for it.

In addition to the serious work of the General Assembly of Member Countries, the meetings of the Council and of its working committees, a number of excursions are being planned for the Sunday at the beginning of the Congress and for the Sunday immediately after it formally closes. One of these excursions is likely to be a tour of the canals of Amsterdam. On Tuesday, 11 September, special invitations are being issued for the opening of the Netherlands Parliament. It is also likely that visits will be arranged to University departments and technical colleges, as well as to manufacturing plants of special interest to scientific film-users and makers.

A great deal of work has already been done in Great Britain by a working-party of the S.F.A. International Committee to ensure that this country shall be as well represented as possible in all fields of scientific film-using and making.

The Research Film Committee of the International Scientific Film Association is hoping to show large numbers of photographs of special applications of scientific cinematography and the apparatus used in research film-making. Anyone who can contribute to the British section of the exhibit is particularly asked to get into touch as soon as possible with the British S.F.A. at 4 Great Russell Street, London, W.C.1, giving brief details of what they would like to show. Similarly, if anyone has information about any interesting work which is being done in this country, they are also invited, having obtained the necessary permission, to pass on that information for the benefit of other workers in the same fields.

Only by the most effective and prompt co-operation can the delegates from this country be provided with the films and information which will enable them to show properly what Great Britain is doing in the realm of scientific films.

Trecastell Mines Re-Open

THE re-opening of the flooded workings of the Trecastell lead and zinc mines, abandoned more than 30 years ago, has been going on for nearly three years, and it is now a matter of weeks before the mine is in production again. All that is awaited is the completion of a two-storey building in which are combined a crushing mill and an extraction plant which will use the modern 'flotation' method of separating the lead and the zinc from the rock. About 30 men are employed there at present and more are likely to be taken on. It is hoped that the yield will reach 350 tons of ore a week, equivalent to about 50 tons of lead and zinc in equal proportions. There may also be a little silver as well.

Trecastell is but one of the enterprises which promises a new lease of life for lead mining in the Conway Valley. Another company, with wide South African interests, have embarked on a long-term project for winning lead and zinc from an area which forms part of the Gwydir Forest, near Betwys-y-Coed, where there are many derelict mines, some of which have not been worked for 100 years or more. Preparatory work for the re-opening of the Parc Mine, the largest and most recently worked of the group, is well in hand, but it will be some time before actual work is started. This project is expected to provide work eventually for about 200 men. The plans envisage the linking-up of a number of disused mines.

Key Industry Duty

Acetone Exempt from Additional Tax

THE Treasury have made an Order under Section 10(5) of the Finance Act, 1926, continuing from 20 August, 1951, until 19 February, 1952, the exemption from Key Industry Duty of all the articles exempted from that duty by previous Orders which expire on 19 August, with the addition of:—

Barium hydroxide, *o*-Chloromononitrobenzene, *n*-Hexyl alcohol, Tetraethylthiuram disulphide, Tetramethylthiuram disulphide, Thionyl chloride, *o*-4-Xylidine (an aminoxylene), Zinc dibutyldithiocarbamate (a salt of substituted dithiocarbamic acid).

and with the deletion of:—

Ammonium bromide, Benzyl cyanide.

Cellulose acetate, where the weight of the acetyl content, calculated as acetic acid, is less than 55½ per cent but not less than 50 per cent by weight of the cellulose acetate, not being cellulose acetate which is an ingredient or forms part of a composite article.

p-Chlorophenol (a chlorophenol), Cobalt carbonate, Cobalt sulphate, Dibenzthiazyl disulphide, Dimethyl sulphate (a methyl ester), 4: 6-Dinitro-*o*-cresol (OH-1) (a nitrocresol), Ethylene glycol monobutyl ether, Ethylene glycol monoethyl ether, Ethylene glycol monomethyl ether, Diethylene glycol monobutyl ether, Diethylene glycol monoethyl ether, Diethylene glycol monomethyl ether.

Acetates and phthalates of:—Ethylene glycol monoethyl ether, Diethylene glycol monobutyl ether, Diethylene glycol monoethyl ether, Diethylene glycol monomethyl ether.

Acetates of:—Ethylene glycol monobutyl ether, Ethylene glycol monomethyl ether.

Hydroquinone, Mercaptobenzthiazole, 2-Napthyl benzoate (a naphthyl ester).

The Order is the Safeguarding of Industries (Exemption) (No. 9) Order, 1951, and is published as Statutory Instruments 1951 No. 1489.

The Treasury have also made the Additional Import Duties (No. 4) Order, 1951, continuing the exemption of acetone from additional duty under the Import Duties Act, 1932, from 20 August, 1951, to 19 February, 1952. The Order is published as Statutory Instruments 1951, No. 1488.

Copies of these two Orders may be obtained (price 4d. net; by post 5½d.) in the case of S.I. 1489 and (price 2d. net; by post 3½d.) in the case of S.I. 1488, from H.M. Stationery Office or through any bookseller.

Basic Chemicals Expansion

North American Cyanamid's Plans

AN expansion of facilities for the production of basic chemicals at plants in Niagara Falls and Welland, Ontario, was announced recently by A. O. Williams, vice-president of North American Cyanamid, Ltd. Accelerated defence and civilian demand both in the United States and Canada for chemicals derived from products produced at these plants was given as the reason for the expansion.

A further step in the expansion programme will be the installation of equipment which will increase American Cyanamid Company's capacity for the production of melamine at Willow Island, West Virginia.

For a number of months, synthetic resins made from melamine have been in short supply and the increased capacity should help to alleviate these shortages. In addition to numerous civilian uses melamine is required for the production of overseas shipping containers, military map papers, uniform buttons, plastic tableware, high altitude ignition parts, radar components, paint, shrink-resistant uniform cloth and fire retardent tent liners.

The current expansion involves the installation of furnaces, liquid air equipment, ovens and other facilities which will increase production of calcium cyanamide at Niagara Falls and of dicyandiamide at the Welland Works. Construction will be started immediately and date of completion will be dependent upon deliveries of equipment and supplies.

The increased production of calcium cyanamid will make possible greater quantities of cyanides which are used for such chemicals as acrylonitrile, an important factor in the production of Buna N type synthetic rubber and basic ingredient in some of the new synthetic wool-like fibres. Dicyandiamide is required for the production of melamine and the new capacity will make it possible to increase the supply of dicyandiamide to the new company facilities for melamine at Willow Island.

Fire Hazards Investigated

Tests at the Request of the Senior Chemical Inspector of Factories

HAZARD of sparks caused by the use of certain kinds of aluminium paint on rusty iron, and the explosion hazard of drums or tanks that have contained certain inflammable liquids were among the problems examined by the Joint Fire Research Organisation at the request of the Factory Department of the Ministry of Labour and National Service.

Results of these investigations and its research programme carried out last year, are contained in the Report of the Fire Research Board for 1950, annual report of the Joint Fire Research Organisation just published for the Department of Scientific and Industrial Research and the Fire Offices Committee (HMSO 2s. 8d., post paid).

In some circumstances when struck by a steel tool, iron surfaces coated with aluminium paint can produce sparks which are capable of igniting inflammable gas-air mixtures. The problem was first investigated by the Safety in Mines Research Board. It was found that sparks occurred only when the paint had been applied over a rusty surface and were more liable to occur if the paints had been previously heated.

. Thermite reaction between the iron oxide and the aluminium initiated at the point of impact between the striking tool and the painted surface was suggested as the cause of the sparks. A possible explosion hazard was thus created by the use of aluminium paints on steelwork in situations where inflammable gases might be present.

Examination Asked For

Evidence showed that the extent of the risk depended on the type of paint, and the Senior Chemical Inspector of Factories requested a further comparative examination of certain types of paint now available. A representative range of paints was therefore obtained with the co-operation of a commercial company, and a few special types were compounded in the laboratory.

These paints were applied to mild steel plates 8 in. by 3 in. by $\frac{3}{8}$ in. cut from flat bar. One side was left intact, but the other was machined off and exposed to the atmosphere so as to become rusted. This was done as it was considered that the type of iron oxide might affect the liability to produce sparks.

Prepared specimens were then painted on both sides and allowed to dry in the air at room temperature. When dry, the specimens were struck with a steel striker in an explosion box which contained an atmosphere of 18 per cent coal gas in air. The box had a wired glass observation window, and a large cellulose panel as an explosion release.

Special Atmospheres

If no explosion occurred after 50 strokes the specimen was heated to 150°C. (100°C. with certain paints) for 48 hours and after cooling was re-tested. If there was still no explosion the specimen was heated at higher temperatures. In addition to the tests using coal gas, some specimens were tested in atmospheres of air with *n*-hexane, petrol, and carbon disulphide. These showed that sparks which did not ignite the coal gas mixture were unlikely to ignite petrol vapour, but that the carbon disulphide was rather more easily ignited.

None of the paints applied to bright unrusted samples emitted sparks. Some of the paints applied to the rusty iron emitted sparks without being pre-heated, but the sparks were not incendive except in the case of cellulose nitrate paint mixed in the laboratory; none of the commercial paints emitted incendive sparks without being pre-heated. After pre-heating, all of the paints emitted sparks, and with all but four the sparks were incendive.

In general the tendency to emit sparks increased with the pre-heating temperature.

With the paints which yielded non-incendive sparks, the maximum brightness of the sparks was obtained after pre-heating the specimen panels to about 250°C. Pre-heating tended to decrease the plasticity of the paint film and also increased the liability to spark emission. Brittleness of the film was not, however, found to be a reliable index of the liability to spark emission; some paints were, in fact, heated to destruction without developing the tendency to emit incendive sparks.

Investigations showed that the use of non-sparking tools did not materially reduce the

hazard with the painted specimens. The extent of the hazard, as evidenced by the tests, appeared to be influenced by the composition of the paint medium and the nature of the aluminium powder.

Commercial oil-bound aluminium paints, it was concluded, should be safe in practice if they were not heated above 150°C., or if they were applied to unrusted steel or iron. Use of red lead or iron oxide primers did not increase the spark hazard.

Drum Repair Risks

Safety precautions to be taken during the repair of drums or tanks that have contained inflammable liquids prescribed under the Factories Acts of 1937 and 1948 permitted some relaxation with certain containers used for liquids of flash point not less than 150°F. (65.6°C.). Explosions, however, had been reported during the repair of drums which had contained kerosine (flash point 105°F. (40.6°C)).

The Senior Chemical Inspector of Factories had therefore asked for tests to be made to determine whether the explosions might not have been caused by the residue of kerosene present or possibly by the presence also of a certain proportion of material of lower boiling point.

Investigation included liquids covering a range of flash points. Small quantities of the liquids were distributed over the interior wall of a five or 19-gallon drum, or contained in a small metal cup fastened to the shell. The drums were heated from outside with a gas blowpipe, the jet of which impinged near the spot where the cup was fixed, and measurements were taken of the rise of the air temperature inside.

Explosions were obtained with kerosine, tractor vaporising oil, diesel oil and decalin; lubricating oil and oleine ignited without exploding; arachis oil neither exploded nor ignited. There was a striking difference between the behaviour of pure linseed oil and a linseed oil paint thinner containing about 10 per cent of solvent with a low boiling point. The former ignited but did not explode, whereas the sample containing the latter exploded.

Occurrence of the explosions was found to be when the temperature inside the drum was above the flash point of the liquid and initiation was considered to be from the heated spot on the wall which was at a higher temperature than the self-ignition temperature of the oil.

It followed that, for any given heating source large drums, thick walls, and low-temperature sources of heat would reduce the temperature rise in the interior and therefore reduce the hazard. Extent of the danger increased as the flash point of the liquid was reduced and would be increased by more intense and prolonged heating. Small quantities of low boiling liquids added to the heavier oils would seriously increase the hazard.

Part of the duty of the Factory Department of the Ministry of Labour and National Service is to assess the hazard of the combustible dusts which are produced in industrial processes.

For many years suspected dusts have been examined in the original apparatus designed by Professor R. V. Wheeler. In general, the tests purport to discriminate between dangerous and non-dangerous dusts; but they are not satisfactory for dusts of certain types (metal dusts, for example) and for those which are not easily dispersed in small-scale apparatus.

Design of a test for these difficult dusts is, therefore, an urgent problem. Fields of research in which investigations are necessary for such a procedure fall naturally into the province of the Fire Research Board. At the moment it would not be convenient for the work to be undertaken at the Fire Research Station. Arrangements have therefore been made with the Ministry of Fuel and Power, and suitable arrangements have been made with the director of the Safety in Mines Research Establishment to conduct this work at Buxton as part of the programme of the Fire Research Board.

Extinction of Inflammable Liquids

Considerable interest has been aroused in the possibility of using methyl iodide as a substitute for methyl bromide, and in the possibility of introducing chlorobromomethane as a substitute for both. New data have been obtained of the effects of these inhibitors on the combustion limits of *n*-hexane and the Medical Research Council in its investigation considered that methyl iodide was about ten times as toxic as carbon tetrachloride and at least as toxic as methyl bromide.

An analysis of water sprays was completed. Several methods of classifying

sprays were considered and some of these will be described in publications which are being prepared; one which is likely to have practical applications, was based on the specific surface, or the total surface area of all the drops in an average sample with an aggregate volume of one cubic centimetre. This area would be greater in a spray composed of small drops than in one which contained a proportion of large drops.

The Fire Research Organisation received 679 technical inquiries in 1950 compared with 594 in the previous year. The number of inquiries in connection with which experimental work or tests were required was 93 compared with 69 in 1949, 50 in 1948, and 26 in 1947.

At the request of the Inspecting Officer of Railways, Ministry of Transport, a visit was paid to the scene of the Beattock train disaster and samples were taken of boards with the types of decorative finish used in the compartments involved; specimens of the types used in the Penmanshiel disaster were also examined. Design of a suitable test which could be used in the factory in development of new types of finish were explored in collaboration with the Research Department of the Railway Executive.

In view of the interest aroused in the spread of flame hazard of certain nitro-cellulose lacquers, tests were carried out on samples of plywood treated with nitro-cellulose lacquers with different plasticisers. Whereas dibutylphthalate and camphor gave a lacquer which permitted very rapid spread of flame, tricresylphosphate gave a lacquer, the spread of flame characteristic of which was not greatly different from that of untreated plywood.

New Plastic Trials

A new transparent plastic was tested, which was similar in appearance to methyl methacrylate, but it was less easy to ignite than either wood or methyl methacrylate, in the absence of supporting radiation. Under increasing incident heat radiation, however, its ignitability increased until it was equal to that of methyl methacrylate under intense radiation. It had the advantage that it did not shed burning drops when ignited, and it was classified as non-inflammable in the standard test of B.S. 476.

Comparative tests were made on plastic and rubber-insulated cables under conditions of external heat and current over-loading.

DSIR To Show Model

Will Demonstrate Sulphur Recovery

AMONG the exhibits to be shown on the DSIR stand at the Engineering Marine & Welding Exhibition which is to be held at Olympia from 30 August to 13 September is a model demonstrating the operation and control of a plant for the recovery of ammonium sulphate and sulphur from power station flue gases. The plant has been developed at the Fuel Research Station, where, after preliminary work with a 1,000 cu. ft./hr. model, a 25,000 cu. ft./hr. installation is now in operation.

Not Economic

The power stations that have so far scrubbed flue gases have used methods which produce calcium sulphate as a solution in water or as a sludge. As no proved economic way has yet been discovered of disposing commercially of this product in the form in which it is obtained it has been discharged into a river or dumped at sea. By comparison, the scrubbing by the ammonia process would yield mainly ammonium sulphate with some sulphur.

The method being tried at the Fuel Research Station is the Fulham Simon-Carves process, which was tried in preliminary tests before the war in a pilot plant at the Fulham generating station. A concentrated solution containing ammonium sulphate, sulphite, bisulphite, thiosulphate, etc., is used to scrub the flue gases, and ammonia in the form of concentrated gas liquor is added to the solution at a rate corresponding to the absorption of sulphur dioxide.

The concentrations are kept constant by running liquor off from the scrubber when necessary and replacing it with water. The liquor is filtered and heated to 200°C. in an autoclave with a small amount of sulphuric acid, and on decomposition gives ammonium sulphate and a little elemental sulphur.

During pilot plant operation it was found difficult to control the composition of the liquid in the scrubber in such a way that neither ammonia nor sulphur dioxide was lost with the scrubbed gas. A vapour pressure recorder, designed by the originators of the process to overcome this difficulty, is included in the equipment at the Fuel Research Station, and conditions have been found that will give satisfactory control.

Portugal's Bulk Bitumen Installation

Second Shell Depot Inaugurated

COSTING nearly £200,000 and with a storage capacity of 6,000 tons, the second of the three bulk bitumen depots being constructed for Shell and its associated companies was officially opened at Setubal, south of Lisbon, Portugal, by the Minister of Economy, Sr. Doctor Ulisses Cortez, last month.

The opening of the Setubal installation is part of a new programme to supplement supplies of bitumen in Europe by building depots where bitumen is received in bulk by ocean tanker from the most economical source. The advantages of bulk bitumen delivery are already well known to the trade. Transport by truck in liquid form obviates the necessity of decanting and reheating the bitumen, which remains solid at normal temperature.

This system effects a considerable economy in transport, time, manual work and energy, and also enables sufficient reserve stocks of bitumen to be set up to meet any emergency. Shell's present programme now brings these benefits to new markets.

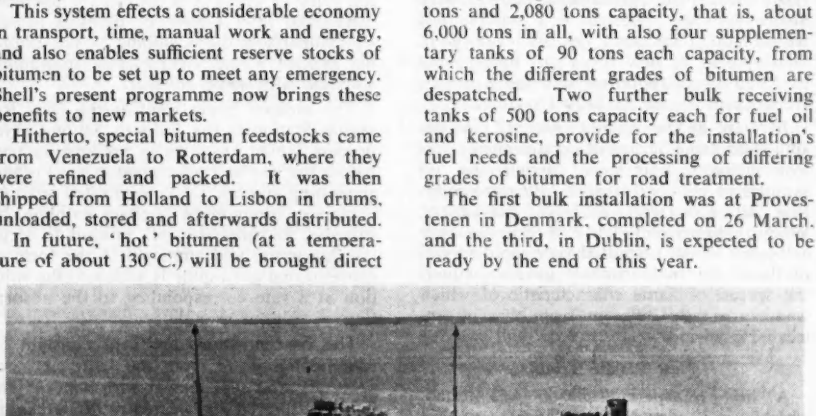
Hitherto, special bitumen feedstocks came from Venezuela to Rotterdam, where they were refined and packed. It was then shipped from Holland to Lisbon in drums, unloaded, stored and afterwards distributed.

In future, 'hot' bitumen (at a temperature of about 130°C.) will be brought direct to Setubal from the Caribbean in three specially converted 9,000 ton Shell tankers—the *Lembulus*, the *Labiosa* and the *Liparus*—each of which carries about 4,000 tons of bitumen in centre tanks specially equipped with coils and fitted with jacketed lines and pumps. The balance of the cargo (black oils) is carried in the wing tanks.

A few days before the inauguration ceremony at Setubal, the tanker *Labiosa*, although the largest vessel ever to enter Setubal harbour, went alongside the installation pier without difficulty. Special pumps transferred the product (at a temperature of 130° Centigrade) through heated pipelines to the coiled bulk receiving tanks.

At the Setubal installation, considered to be the most up-to-date of its kind, there are two receiving tanks for bitumen of 3,800 tons and 2,080 tons capacity, that is, about 6,000 tons in all, with also four supplementary tanks of 90 tons each capacity, from which the different grades of bitumen are despatched. Two further bulk receiving tanks of 500 tons capacity each for fuel oil and kerosine, provide for the installation's fuel needs and the processing of differing grades of bitumen for road treatment.

The first bulk installation was at Provestenen in Denmark, completed on 26 March, and the third, in Dublin, is expected to be ready by the end of this year.



The tanker **Labiosa** *unloading at Setubal*

American Newsletter

STUDIES launched to determine the technical and economic feasibility of building dual-purpose reactors to produce plutonium and electricity are referred to in its tenth semi-annual report, for the first half of 1951, recently released by the U.S. Atomic Energy Commission. Considerable progress was achieved in design and construction of new reactors, experiments with new types, and long-range investigations to evolve a programme of future development. The most advanced work is that on an experimental breeder reactor which is now nearing completion at the Reactor Testing Station in Idaho. It is planned to put this reactor through a period of testing at low power levels to determine its operating characteristics with 'fast'-neutrons. The reactor will use enriched uranium as fuel and a blanket of natural uranium round the core as the 'fertile' material in which breeding may take place. The rate of fuel burn-up will be compared with the rate at which new fuel (plutonium) is manufactured. Theoretically, if no neutrons were wasted, it would be possible to breed new fuel faster than the operating fuel is consumed. In practice, however, construction materials, fission products and cooling fluids capture some of the neutrons. The practical problem of reactor designers is therefore to ensure that as large a proportion as possible of the surplus neutrons goes into the manufacture of new fuel.

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A 'white brass' alloy, which gives the same service as nickel in that it can serve as a base for chromium finish has been developed by the electrochemicals department of the E. I. Du Pont de Nemours Company, Wilmington, Delaware. When nickel became in short supply Du Pont's technicians referred back to a paper on a 'White Brass Plating Process' given by a member of its staff at the 26th annual convention of the American Electroplaters' Society in Milwaukee, Wisconsin, in 1938. The basic patent was issued to the company the following year. The new process is the result of intensive research work in Du Pont laboratories and in manufacturers' plants to adapt it to present production demands. Preliminary results indicate that chromium, plated over white brass is indistinguishable in brightness and colour from that plated on a nickel base. The white brass used in the Du Pont process is an 80/20 zinc-copper alloy which is electrodeposited from a cyanide bath using special brightening agents. In the meantime, all information on the development has been made available to industry which, it is understood, is conducting large scale trials.

* * *

THE 23rd Exposition of Chemical Industries will be held in New York from the 26 November to 1 December. All the available exhibition space on the four floors of the Grand Central Palace has already been booked by 381 leading firms according to an announcement made by the International Exposition Company, New York. Processing equipment which has recently been developed or re-designed will play a prominent part in this two yearly event. The show will also reveal new manufacturing materials, in the raw and in application to new machinery; up-to-date equipment to meet modern specifications required by intensified operation; and a number of new products.

* * *

PLANS are under discussion between the U.S. Department of the Interior and F. Eberstadt & Co., New York investment bankers, for the commercial production of petrol and chemicals from coal by a hydrogenation process originally developed in Germany and on which much subsequent research work has been done by scientists in U.S. Bureau of Mines laboratories and demonstration plants. Part of the discussions, it is believed, revolve about a proposed plant, the cost of which has been estimated as high as $300 million. Production is estimated at between 15,000 and 30,000 barrels daily, about half of which would be petrol and the remainder composed of benzene, phenol and toluene. Commenting on the development Ferdinand Eberstadt, president of the banking firm, said: 'We have been studying the matter of coal hydrogenation for many months and after extended discussions with the Department of the Interior through the Col-Chem Corporation in which we are interested, have made some tentative and conditional

proposals for the consideration of the Department of the Interior.' In Washington, W C. Schroeder, assistant director of the Bureau of Mines and a staunch supporter of synthetic fuels expansion, confirmed official interest in the development, but emphasised that they were in a 'preliminary stage'. He added, however, that hydrogenation projects are also being discussed with other unnamed concerns. The department's interest, he indicated, is twofold: On the one hand there is the long-range interest in promoting production of petrol from coal to serve as a cushion against depletion of America's oil reserves, and on the other hand there is the immediate interest in the chemical by-products that coal hydrogenation could be made to yield.

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THE first large-scale and self-contained plant for titanium metal production is to be erected at Henderson, Nevada, in western United States, by the Titanium Metals Corporation of America. The company is jointly owned by the National Lead Company and the Allegheny Ludlum Steel Corporation. Operations at Henderson will include production of titanium sponge and the melting of the titanium metal into ingots. Initially production is expected to be at a level of 3,600 tons of titanium metal a year. The plant, which will employ about 1,000 persons in productive capacities, is scheduled to be in operation in about one year.

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EXCLUSIVE North American rights to use its process for the design and construction of plant to produce acetylene from natural gas have been acquired from Badische Anilin and Soda-Fabrik by the Chemical Construction Corporation, New York, an affiliate of the American Cyanamid Co. The process, which is said to use a selective solvent specially developed for the purpose, has been fully proved in commercial use and is said to offer major economic advantages to users of the multi-purpose gas since it produces acetylene of high purity at a low cost.

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USING lignite, a low grade of coal for fuel, a new aluminium smelting plant is to be built in Milam County, Texas, by the Aluminium Company of America. The new plant, which is estimated to cost $80 million, is scheduled to go into production by the autumn of 1952, and will be the fourth largest aluminium reduction plant in America, having an annual production capacity of 85,000 tons. The large amounts of electricity required by the Alcoa plant will be generated by steam-driven equipment using processed lignite as fuel. The company has long-term leases on about 9,000 acres of lignite-bearing land in the Texas County. Engineering surveys show lignite deposits existing to a depth of several hundred feet on the site of a prehistoric river bed. The black, coal-like mineral can be extracted both by strip and slope mining.

Post Graduate Lectures

THE eleventh series of post-graduate lectures organised by the Oil and Colour Chemists' Association will be given by H. W. Thompson, M.A., D.Phil., F.R.S., under the general title of 'Molecular Dynamics and Chemicals Problems.' The lecturer, who is a leading authority on molecular structure and the application of the studies of such structure to the solution of chemical problems, will describe developments in the subject over the past few years.

The lectures will be given in the Lecture Theatre of the Royal Institution, 21 Albemarle Street, London, W.1, at 6.30 p.m. on each of the following Thursdays, October 11th, 18th and 25th.

The charge for the three lectures both to members of the Association and visitors is 10s., and a remittance for this amount should accompany applications in advance to the General Secretary, Oil and Colour Chemists' Association, Memorial Hall, Farringdon Street, London, E.C.4. Admission will be by ticket only and Junior Members of the Association, who are invited to attend free of charge, should apply for complimentary tickets.

Nitrogen Preserves Food

A new process for packaging foods in nitrogen has been announced by the Air Products Company, a subsidiary of Union Carbide and Carbon Company in the United States. It is said that potato crisps, roasted nuts, soup powders and dehydrated foods will stay fresher for a longer time by this new packaging.

The company's spokesman has stated that nitrogen is harmless, tasteless and does not effect flavour or colour. By eliminating atmospheric oxygen the process is said to keep food fresh for months or even a year.

West German Coal Problems

Shortage Still Hampers Production

COAL production in West Germany declined further in the past four weeks and at a daily rate of 370,000 tons now leaves no margin for replenishment of stocks. Total supplies of industrial fuel in the third quarter of 1951 will be below the second quarter, and in view of the postponement of winter storage in power stations, and so on, it is almost certain that deliveries to industry will not recover to any noticeable extent when the holiday season is over. While some chemical manufacturers have been hit by the coal shortage, others have hitherto avoided embarrassment by suitable arrangement of staff holidays. It is feared, however, that the fuel difficulties will be felt even more acutely next month.

West German export interests have recently drawn attention to the discrepancy in trade with the sterling area resulting from the big rise in commodity prices. Although German export prices for manufactured goods have also increased, the adverse balance of trade with the sterling area is in fact much larger than anticipated. While it is recognised that the British authorities have shown much understanding for German export difficulties, industrial circles complain of the handicap which Empire preferences represent in Dominion and Colonial markets.

No Benefits Expected

German chemical exporters do not expect to benefit materially from the new liberalisation list put into operation by the OEEC Council with effect from 15 August, as the most important foreign buyers have already put up to 80 per cent of German exports on a free list. Parodoxically, German industry seems to be more interested in having the 'liberalisation stop' removed from German import trade. Attention is drawn to the adverse effect of the Far Eastern conflict on the German chemical industry which before the war maintained a large export business with China, and it is argued that in view of the great changes which have occurred in international commerce during the past 12 months, substantial alterations are required in West Germany's trade agreements when these come up for renewal. One of these, with Belgium, has just been extended until the end of this year.

Middle East crude oil, imported from Saudi Arabia, is now being treated at the Ruhrchemie plant at Oberhausen-Holten. Petrol, diesel and fuel oils are being produced on a small scale but the new refinery installations which will have a throughput capacity of 250,000 tons of crude annually, including tracking and reforming units, will not come into operation until the end of the year. Chemische Werke Huels have met unexpected difficulties owing to insufficient coal allocations and a few weeks ago considered the suspension of certain operations; it was stated that the employment of large numbers of workers might cease if the coal allocations were not increased.

Electricity Supplies Improved

The German aluminium industry, on the other hand, has profited from the improved electricity supply in the summer months. The electrolytic plant at Toeging at present produces about 3,500 tons of aluminium while the alumina works at Schwandorf provide some 6,000 tons of alumina a month. At Luenen about 60 per cent of capacity is being utilised at present; the production of alumina amounts to 3,000 tons and that of aluminium to 1,500 tons a month. The electrolytic aluminium plant at Grevenbroich is still idle, but refining operations have been resumed.

Rayon and staple fibre production in West Germany made further slight progress this year. In the first six months of 1951, 30,450 tons of rayon were produced against 52,750 tons in the whole of 1950, and 60,780 tons of staple fibre, against 112,600 tons last year. Exports of staple fibre in the first half of this year were 15,753 tons, compared with 15,577 tons for the whole of 1950; while for the same periods shipments abroad of rayon were 4,912 tons against 5,849 tons. The supply of chemicals for rayon manufacture has improved, but imports of wood pulp give rise to complaints, and the coal allocations cover only one-third of the needs at September, 1950, the remainder having to be met in the form of dearer coal outside the allocations.

Changes in Import Licensing Control

Additions and Amendments to 'Liberalised' List

AMENDMENTS and additions to the list of goods which may be freely imported from the 'permitted' countries on the list to which the liberalisation of trade is applied, were announced last week.

These alterations which became effective on 21 August under Notice to Importers, No. 449, has been extended to include the following additions to Open General Licence in Schedule I:—

Group 2—Mineral Products and Metals

Fuller's earth; limestone slabs, rough or worked, of any length but not exceeding 6 in. wide by 9 in. deep; foamed slag.

Group 5—Chemicals, Drugs, etc.

Collodion cotton (nitro-cellulose); putty.

Group 10—Glassware, Pottery, etc.

Under glass and glassware: add glass powder and glass wool.

Group 13—Metal Manufactures and Semi-manufactures

Iron or steel buckets (whether or not coated, enamelled, galvanised or plated); containers made of aluminium or aluminium alloys; containers for gases.

Amendments under Schedule II include the following:—

Group 2—Mineral Products and Metals

The item 'Cadmium residue' is deleted.

The heading 'Metals, the following:—' and all the items thereunder from 'Aluminium' to 'Pig Iron' and the heading 'Ores and concentrates, the following:—' and all the items thereunder from 'Antimony' to 'Zinc' are deleted; and the following substituted:—

Ferro-alloys, unwrought, except:—Ferro-chrome, ferro-silicon, silico-manganese.

Metallic ores, concentrates and residues, except:—Columbite (niobite); molybdenum ores (molybdenite and wulfenite) concentrates and residues; monezite and other thorium ores, concentrates and residues; pyrites; tungsten ores (farberite, hubnerite, scheelite and wolframite) concentrates and residues; uranium ores, concentrates and residues.

Metalloids, the following:—Arsenic, boron, selenium, silicon, tellurium.

Metals (including alloys other than ferro-alloys), unwrought except:—Aluminium primary; copper, lead and lead alloys; magnesium and magnesium alloys; silver; steel ingots, blooms, billets and slabs; thorium and thorium alloys; uranium, and uranium alloys; zinc.

Metals in the form of powder, except:—Gold, silver, thorium and thorium alloys, uranium and uranium alloys.

Group 5—Chemicals, Drugs, Medicines, Dyes and Colours, etc.

Under the heading 'Drugs, medicines and medicinal preparations, manufactured or prepared, except:—' the item 'Chloramphenicol (chloromycetin)' is deleted. Under the heading 'Synthetic organic chemicals, analytical reagents, other fine chemicals and chemicals manufactured by fermentation processes as enumerated in the Board of Trade lists issued under Section I of the Safeguarding of Industries Act, 1921, except:—' the sub-heading '(c) the following chemicals, *viz*:—' and the items 'Acetic anhydride, acid, monochlor-acetic' are deleted.

Group 13—Metal Manufactures and Semi-Manufactures

The item 'Kegs and drums of metal, of a capacity of 5 gallons and over' is deleted and the following item substituted:—'Containers of non-precious metal (whether or not coated, enamelled, galvanised or plated) of a capacity of one gallon or over'.

Grant of Open Individual Licenses for the import of metal containers of a capacity of less than one gallon from the 'permitted' countries was also announced by the Board of Trade last week under Notice to Importers, No. 450.

For the purpose of these licences metal containers of less than one gallon capacity are defined as containers of non-precious metal, whether or not coated, enamelled, galvanised or plated.

Applications for licences should be made on form ILD/A (Revised) direct to the Import Licensing Branch, Board of Trade, Romney House, Tufton Street, London, S.W.1.

There will be no limit to quantity, value, or period of validity, but the Board of Trade reserves the right to withdraw or revoke licences if necessary.

South African News

From OUR OWN CORRESPONDENT

THE cement scarcity in South Africa could be fully solved from the Robertson district, where vast deposits of the highest quality cement-producing limestone were awaiting exploitation, the president of the Robertson Chamber of Commerce recently stated. The deposits had been 'frozen' for more than 20 years. They were covered by long-standing options which had never been exercised. He considered that the national interest now demanded an inquiry into these options and, if the owners were not prepared to exercise them within a reasonable time, the opportunity should be transferred to others. The principal deposits were at Dassieshoek and Klaasvoogds, in the foothills of the Langebergen. They had been surveyed.

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About 50 tons of sulphur a month is being produced at the Johannesburg gas works. The gas engineer and manager of the gas works said recently that sulphuretted hydrogen was removed from the gas manufactured by means of iron oxide from the Modderfontein dynamite factory. The gas is passed through 16 cast-iron boxes containing a mixture of iron oxide and sawdust. The sulphuretted hydrogen is absorbed by the oxide until the mass contains about half sulphur. This material is removed from the boxes and sent to African Explosives and Chemical Industries' factory at Umbogintwini, Durban, where the sulphur is removed.

* * *

In a statement issued with the report of Rhodesia Broken Hill Development Co., Ltd., for 1950 the chairman says that, as a result of the serious world scarcity of sulphur, consideration is being given to extending the activities of the Iron Duke Mine, with a view to supplying sulphur and sulphuric acid, hitherto used only in the company's own works and on the Copperbelt, to large-scale users in the Union.

* * *

All rights in the exploitation and development of considerable phosphate deposits in the north-eastern Transvaal will be taken over by the Union Government and the industry will be carried on by a utility development corporation, the Minister of Economic Affairs has stated. Phosphate production will be regarded as a key industry to be controlled by the Government in the national interest. The final form in which the undertaking will be conducted will be decided by the Cabinet. The object of the undertaking is to ensure that South Africa has all the phosphate it needs and to make the country independent of overseas supplies.

It appears to be the Government's intention to produce the rock phosphate and then sell it to the fertiliser industry for conversion into superphosphate. Thus the only result so far as the industry is concerned is that instead of buying its raw material from overseas it will get it at home, and probably for less. At present the Union spends about £1,000,000 a year in importing phosphates, mostly from Morocco. Not only would the new scheme save that money, but it would also be of great benefit should war cut the Union off from its overseas sources. No doubt these were the two main considerations that influenced the Government in taking this step. The Transvaal deposits would have to be concentrated to bring them up to 32 per cent of phosphoric oxide, which was what the rock phosphate imported from Morocco contained, but this would not present any great technical difficulties.

* * *

The South African Coal, Oil and Gas Corporation, Ltd., hope to start producing 50,000,000 gallons of petrol a year from coal early in 1954, according to a statement made by the managing director. The corporation also aims to produce annually 5,500,000 gallons of diesel oil and 5,000,000 gallons of waxes and solvents. The first equipment should arrive in South Africa by next July. 'A lot of people say we will not be able to start producing by 1954, but I think we should be able to, barring a war,' the managing director said.

It was (he said) planned eventually to double the size of the plant. It was intended to send about 20 South Africans overseas to train as technicians during the second half of next year. They would spend about a year in America, Germany and Britain under the contracts. Germans would have to start

up the plant, and South Africans would take over from them.

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South African technicians will be trained to take over the running of the £4,500,000 crude-oil refinery which the Standard Vacuum Refining Co. of S.A. (Pty.), Ltd., is to erect on 200 acres of land at Wentworth, Durban, said Mr. B. F. Kenney, chairman and managing director of the company. 'About 450 people—300 Europeans and 150 natives—will be employed in the refinery. Initially, trained men from the United States and Britain will operate the plant, but we hope the time will come when South Africans will be able to run it.' The refinery will produce 350,000 gallons of petroleum products a day—about 20 per cent of the Union's total requirements.

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Norton Abrasives (S.A.) (Pty.), Ltd., Isando, Kempton Park, Transvaal, are now in production. This branch of the American company is using the straight-line production techniques for the production of abrasives, the range including vitrified and resinoid bonded grinding wheels up to 30 in. diameter from imported products. The factory also makes mounted wheels and points, segments, sticks, bricks, oilstones and diamond wheels. Three American technicians are training the South African staff.

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The chemical trade in South Africa states that aluminium sulphate, for the manufacture of paper, pulp board and for water purification, after being in short supply for some time is now becoming available in better quantity, caustic soda, carbon of soda and other chemicals made from alkalis like potassium and soda and those derived from chromates, nickel, tin, copper, cobalt, zinc, zinc lead, etc., have been difficult to obtain. This has affected the food canning industry and the electroplaters have suffered through the shortage of salts or cobalt. The paint industry had to search around for supplies of caustic soda and it appeared that the lack of steel drums reduced the supplies of calcium chloride and caustic potash, the last named in very short supply.

Nickel Bans Postponed

THE Ministry of Supply and Board of Trade announce that, following representations by industries affected by the Nickel (Prohibited Uses) Orders, it has been decided that the date from which the nickel plating of articles listed in the Second Schedules to the Orders will be prohibited, shall be 1 October 1951, instead of 22 August 1951.

It has also been decided that the disposal of articles containing controlled material or which are nickel plated shall be permitted without licence up to 31 December 1951. Under the present Orders disposal was prohibited after 1 October and 22 August respectively.

These changes are being made to allow manufacturers more time to turn over to alternative methods of production and to dispose of existing stocks.

Amending Orders giving effect to these decisions were issued on 21 August.

ACTH Symposium

Professor Todd Among Guests

LEADING European and American biochemists will gather in Chicago on 18 September to attend an international symposium on the chemistry of the hormonal drug ACTH. The conference will be sponsored by Armour & Company, and leading American chemical and pharmaceutical organisations will be hosts to the biochemists from overseas.

The Armour research division has interested itself especially in three younger scientists, two English and one Swedish, who have never before had the opportunity of meeting American biochemists. These three are: Mr. George W. Kenner, chemist, and Mr. Fred Sanger, biochemist, both of Cambridge University, England; and Mr. Jerker Porath, biochemist, of Uppsala University, Sweden.

Other leading visitors will include: Professor Arne Tiselius, biochemist of the University of Uppsala, and winner of the Nobel Prize in Chemistry in 1948; Professor A. R. Todd, Cambridge biochemist; and Mr. C. J. O'R. Morris, of London County Hospital.

Leading American biochemists from universities and research organisations will also deliver papers at the symposium.

Mr. Victor Conquest, vice-president of Armour & Co., and head of its research division, said: 'We feel certain that bringing together a group of men so outstanding in their field for an exchange of ideas and discussion will advance the knowledge of ACTH tremendously'.

HOME

OCCA Technical Trade Exhibition

Technical advances in those industries supplying the paint, varnish, printing ink, linoleum and other allied industries, will again be the theme of the fourth technical trade exhibition, organised by the London Section of the Oil and Colour Chemists' Association, which will be held in April next year. The exhibition will, as before, be at the Borough Polytechnic, London, S.E.1. It is realised that new developments are not forthcoming every year, and an alternative is suggested by the technical presentation of the properties and uses of existing products, provided the treatment is scientific.

New Chemical Glassware Factory

Annealing furnaces and specialised equipment, at present being designed, will be features of the new factory to be constructed at Stone, Staffs, by Quickfit & Quartz, Ltd., one of the Triplex group of companies. The new works has been made necessary by the firm's increased export programme. Nearly half its output at present goes overseas. Building is expected to begin next month.

Smoke By-Law

Because the atmosphere of Middlewich is persistently polluted by smoke, Middlewich Urban Council is to adopt a by-law making the emission of black smoke from factory chimneys an offence. These decisions were made on 13 August, following a report by the sanitary inspector, Mr. F. Costello. Mr. Costello said that while the principal offenders were the salt works operating the open pan system, other factory chimneys were also emitting far more smoke than was necessary. The British Railways shunting engine, he added, persistently caused heavy pollution and was the cause of more annoyance than any other single chimney.

New Piling Record

A steel foundation pile driven at the site of the factory being built for Forth Chemicals, Ltd., at Grangemouth, Scotland, reached a depth, on 14 August, of 161 ft. 6 in. before touching a solid subsoil. This depth, it is understood, is a record in Britain. Since work began on the factory in April more than 200 piles have been driven to an average depth of 120 ft. The factory, which is to cost £1,000,000, will use petroleum fractions from the oil refinery nearby to manufacture a component of plastics.

New Source of Hecogenin

The Medical Research Council has found a new source of hecogenin (the basis of cortisone, which is used in the treatment of rheumatic diseases), says the *British Medical Journal*. Hecogenin has been discovered in sisal waste, of which 10,000 tons or more are available in East Africa from a cultivated crop. 'If the yield of cortisone from hecogenin is favourable, then there is a Commonwealth (and sterling) source which is by no means to be despised,' the *Journal* adds. Cortisone is at present manufactured in America from ox bile. The drug is so scarce that the 56 hospitals in England and Wales selected to receive it are rationed to nine grammes a month.

Personalities in the News

The directors of Hardman and Holden, Ltd., announce that MR. CHARLES E. YOUNG, a director and sales manager, has been appointed a joint managing director. MR. GEOFFREY OGDEN, general works manager, has been appointed a director.

DR. RICHARD SELIGMAN is to be the first recipient of the gold medal of the Society of Dairy Technology. The award for distinguished service to the dairy industry anywhere in the world will not be made more than three times in 10 years. The doctor was the pioneer of autogenous welding of aluminium and of applying welding to vessels used in the milk industry. In 1923 he invented the plate heating exchanger used in milk pasteurisation. Presentation of the medal will be made at the annual meeting of the society on 22 October.

MR. R. MELLOR, M.C., B.A., managing director of Whieldon Sanitary Potteries Limited, has been appointed to a seat on the Board of Doulton and Co. Limited.

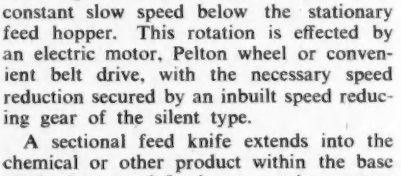
MR. J. H. SHOOLBRED, secretary of Doulton and Co. Limited, has been appointed to a seat on the boards of their subsidiary companies, Whieldon Sanitary Potteries Limited and Arthur Winkle and Co. Limited.

Dry Chemical Feeder

THE latest development in the feeding of a wide range of materials of a granular nature, including dry pulverised chemicals and similar products, is represented by the 'RT' feeder of the Paterson Engineering Co., Ltd., of London. This is said to have the great advantage of being extremely simple in operation (in spite of the high degree of accuracy), efficiency and freedom from mechanical troubles.

The only moving part of the feeder is the revolving feed table which is rotated at constant slow speed below the stationary feed hopper. This rotation is effected by an electric motor, Pelton wheel or convenient belt drive, with the necessary speed reduction secured by an inbuilt speed reducing gear of the silent type.

A sectional feed knife extends into the chemical or other product within the base of the hopper, deflecting a certain constant volume of material from the table into a



vortex mixer alongside, the quantity deflected being determined by the position of the feed knife and the number of sections of the knife which are in the operating position. The effective thickness of the knife is pre-determined according to the required range of feed capacity, the range available being very wide, while the position of the knife is instantaneously adjustable by the positive external control while the machine is running.

When used for reagents having a tendency to arch or pack, moving agitators are provided within the feed hopper, keeping the mass of chemical in motion, and ensuring uniform gravitational descent to the feed table. The measured stream of chemical is discharged through an opening into the vortex mixer adjoining, where it is intimately mixed with water and discharged to the point of application.

The rate of feed is externally controlled by the rotation of a small friction handwheel mounted above the vortex mixer, which moves the feed knife further into or out of engagement, the position of the knife, and consequently the rate of feed, being shown by a pointer on a divided scale. The worm drive of the knife and pointer ensure positive fixed adjustment, without the necessity for a locking device or the setting of fixing means such as locknuts or set screws, and there is also included a device for adjusting and locking the knife thickness. Also by modification of the speed reduction gear any required delivery can be secured from a few ounces to several cwt. per hour.

An important advantage is the small floor space and head room required, and the feeder is also said to be practically dust-tight in operation, the feed hopper being fitted with a dust-proof cover, so that there is no danger of light materials being airborne by stray currents and deposited in the bearings of motors and other machinery.

Any class of powdered or granulated substance can be handled and another extensive field of application is powdered reagents for water treatment, including sulphate of alumina, lime, chalk, soda-ash, sulphate of iron and activated carbon.

1952 Achema X Exhibition

Within six weeks of its announcement, the Achema X international exhibition of chemical apparatus to be held in Frankfurt from 18-25 May, 1952, by Dechema, has had 10,500 of its 11,200 sq. metres of exhibiting space reserved. In consequence two further exhibition halls have been added to the original five. These are expected to be filled rapidly.

OVERSEAS

Brine Deposits in S.A.

Drilling operations at Kaalpan in the Hopetown district (South Africa), indicate vast deposits of brine, one borehole being capable of delivering 30,000 gallons of brine an hour. The brine content is 65 per cent, and it will probably be pumped to Broadwaters, near Douglas, where it is proposed to erect a £5,500,000 soda-ash factory.

Australian Plastic Industry

Some indication of the growing popularity of plastics in Australia can be seem in the expansion of one of the companies in Melborne, Victoria, engaged in producing a wide range of goods. The turnover of the company (Moulded Products Pty. Ltd.) is four times greater than it was in 1939. In a ten-year period the total quantity of raw materials used has increased 43 times. In the same period employment figures have multiplied by four-and-a-half. The floor space is seventy-three times greater than when the company commenced manufacturing twenty years ago. Continued expansion has led to installation of new plant at three of the company's Victorian factories.

Italian Ammonia from Methane

During the first months of 1952 a new plant will enter service at Novara in Italy to produce over 100 tons of ammonia daily. At the end of the same year another plant will be opened at Ferrara with a capacity of 200 tons of ammonia. Both plants will use methane gas and their erection has been preceded by nine months' work with a specially constructed pilot plant. A good deal of attention is given by Italian technicians to the potentialities of methane gas in chemical industry. The results secured so far are particularly promising as regards nitrogen fertilisers. If subjected to cracking, methane gas yields methyl alcohol or CO_2.

Indian Fertiliser Factory

Good progress is reported in the construction of the Sindri, Bihar, fertiliser factory which is scheduled to go into production next month. The power house and gas plant have been completed and the ammonia plant is stated to be nearing completion. Part of the sulphate plant is ready for the production of ammonia sulphate.

International Nickel Company

The report of The International Nickel Company of Canada, Ltd., and subsidiaries for the three months ended 30 June, 1951, issued by Dr. John F. Thompson, chairman and president, shows net earnings in terms of U.S. currency of $14,653,656 after all charges, depreciation, depletion, taxes, etc.; equivalent, after preferred dividends, to 97c. per share on the common stock. For the six months ended 30 June, 1951, net earnings were $29,385,046, equal to $1.94 a share on the common, compared with $20,385,591, or $1.33 a common share, in the corresponding period a year ago.

Copper and Cobalt from N. Rhodesia

Development of a new source of copper and cobalt in Northern Rhodesia by the aid of an advance of £3 million under the Marshall plan was announced on 16 August by Economic Cooperation Administration Mission to the United Kingdom. The advance is being made to the Chibuluma Mines, to develop a high-grade cobalt ore deposit about seven miles west of Kitwe, near the southern border of the Belgian Congo. Production is expected to begin in 1956, and the yield from the mine is estimated at about 16,000 long tons of copper and 500,000 lb. of cobalt annually.

German Scrap Discussions

It was reported from Bonn on 15 August that a provisional agreement had been reached on the export of German scrap. It is proposed that the Federal Republic should retain for the home market 325,000 tons of the monthly collection; 50,000 tons would be exported, and the next 25,000 tons shared on an equal basis. Of anything over 400,000 tons, two-thirds would go to the Germans, and the remainder be exported.

New Nylon Plant for Canada

Plant to manufacture basic chemicals used in making nylon will be erected by Canadian Industries, Ltd., on a recently-purchased 1,500-acres site of the north bank of the St. Lawrence River between Brockville and Prescott in Ontario. Construction will commence shortly and will be completed in 1953, and the plant will be the largest single project yet undertaken by the company.

Publications & Announcements

VIBRATORS suitable for a wide range of application in connection with hoppers, feed chutes and other similar positions where material tends to 'arch up' are described in its latest announcement by The Magnetic Equipment Co., Ltd. Magco Bin Vibrators are of the electro-magnetic type energised from a.c. mains and have considerable advantages over the motor type, apart from requiring no lubrication or other attention. The vibrator, substantially constructed, consists of two units. The upper comprising a laminated armature attached to the vibrator body, and the lower consisting of a laminated magnet system carrying the operating coil which is wound on an insulated metal bobbin and finally covered with a metal enclosing cover. Degree of vibration is controlled by varying the amptitude of the armature movement by a regulator connected in the circuit. The bin vibrators are at present available in three sizes.

'Magco' Bin vibrator

* * *

EVERY aspect of the iron and steel industry in the United Kingdom is covered in Part I of the British Iron and Steel Federation's Statistical Year Book for 1950, which has just been published. The volume gives tables of iron and steel production, finished steel deliveries and the use of raw materials, as well as exports, prices, stocks and employment in the industry. For convenience, two summary tables at the beginning, give information over a period of years. The first brings together the main statistical series relating to iron ore, coke, pig iron, scrap and steel from 1920-1950. The second sums up information regarding the supply and disposal of steel from 1901-1950. It shows for example, that the total supply (including imports) rose from an annual average of 8.37 million tons in 1921-25, to 11.22 million tons in 1938 and to 17.43 million tons in 1950. Home deliveries over the same period increased from 5.05 million tons to 14.18 million tons.

Also published by the federation is Part II of the Statistical Year Book for 1949 which gives detailed statistics for the 35 main steel-producing and steel-consuming countries of the world. Three tables show, respectively, the world production of iron ore, pig iron and steel, by country over a period of years. In all cases information is brought up to 1949, with the exception of the U.S.S.R. where information later than 1937 has not been available. The two volumes provide a mass of valuable information in an easily accessible form.

* * *

SCIENTIFIC progress has been the subject of three special supplements of *The Times*. Such interest has deservedly been shown in these supplements that it has been decided to make *The Times Review of the Progress of Science* into a regular publication appearing, quarterly, in November, February, May and August. The first issue was produced appropriately at the time of the meeting in Edinburgh of the British Association for the Advancement of Science. The articles, which as usual, cover a wide range of interesting subjects, include: 'Non-ferrous Metals in Engineering,' by G. L. Bailey; 'Insects and Food,' by Sir John Simonsen, F.R.S.; 'Freeze Drying,' by Dr. Edward Hindle, F.R.S.; and 'Infra-red Techniques,' by Dr. G. K. T. Conn.

* * *

INCREASED shortage of steel and the consequent difficulties of replacement, lend an added point to an article on the protection of iron and steel under working conditions, which appears in the July issue of 'Building Topics', house organ of Tretol, Ltd. While giving guidance on practical aspects of protective painting, emphasis is laid on the degree of preparation of metal surfaces prior to painting.

The Chemist's Bookshelf

AN ADVANCED TREATISE ON PHYSICAL CHEMISTRY. Volume II, The Properties of Liquids. By J. R. Partington. London, 1951. Longmans, Green & Co. Pp. 448. 50s.

The series of volumes, of which this is the second, promises to become an outstanding contribution to the literature of physical chemistry. No other book, in fact, attempts anything like a comparable survey of the modern physico-chemical field. Volume I dealt with fundamental principles and with the properties of gases. The present volume, which is much shorter, deals with the characteristic properties of liquids including density, thermal expansion, compressibility, viscosity, thermal conductivity, surface tension, specific heat, vapour pressure, boiling point, latent heat of evaporation and the critical state. Some aspects of solutions are also dealt with, in particular viscosity, surface tension and specific heat but treatment of the general subject of solutions is postponed until a later volume. There is a very short introductory section on the theory of the liquid state which the author judges as unripe for other than a progress report, and a mathematical appendix dealing with determinants and matrices and with co-ordinate geometry of three dimensions. The inclusion of this appendix may well be questioned since it is at least doubtful whether readers who have failed to master these subjects before coming to the appendix will make much headway therein but its inclusion adds little to the bulk of the book.

The most striking feature of Professor Partington's treatment of the subject is his successful combination of an eminently readable account of each topic with a very full and comprehensive list of references, practically all of which are vouched for as having been personally consulted and appraised by the author. Such industry is truly admirable and every working chemist who uses this book will find himself continually in Professor Partington's debt on this score alone. As in the case of Volume I the author has obviously kept before him one guiding principle in deciding what to include and what to leave out—that the book should be of value primarily to the physical chemist at the bench, the experimentalist concerned with the progress of the science rather than to the theoretician or to the teacher. This is not to imply that theory is neglected but rather that only such theory is included which is of immediate application to experiment, or is in a state sufficiently advanced as to be susceptible to experimental verification. Professor Partington properly scorns theoretical interpretations involving equations incapable of experimental test.

An attractive feature of the book is the inclusion of historical notes and references so that a search for data or for some detail of experimental technique is always liable to be brightened by the unexpected discovery of some historical titbit. The views and results of the old masters, Regnault, Stas, Lord Rayleigh and the rest receive their due credit, Professor Partington rightly pointing out that experimental material from such sources is likely to be at least as good if not better than some recent paper by a post-graduate student.

A list of errata for Volume I is included, some indication of the standard of printing and of proof-reading in this series being given by the fact that the errata for the 942 pages of Volume I number no more than 47, of which many would be regarded by most authors as trivial. Since in a reference book of this kind the tools provided for using it are of some importance one detail may be criticised. It would have been a considerable improvement if the list of contents on page vii had been set out in tabular form with reasonable spaces between the main headings. It may however be enough to say of this series of volumes that few physical chemists worthy of the name can afford to be without it.—R.C.P.

Sulphuric Acid from Anhydrite

Finance for New Project

OVER £4 million is being provided for the financing of the United Sulphuric Acid Corporation formed for the production in this country of sulphuric acid from anhydrite (THE CHEMICAL AGE *64*, 658). This and further details as to the location of the factory were released this week.

Ten Per Cent of Requirements

The plant will be constructed at Widnes, on Merseyside, and is expected to be in commercial operation within four years. The process will be the same in essentials as that already used at Billingham by Imperial Chemical Industries, Ltd., which will provide technical information and assistance. Output is estimated at 150,000 tons a year of 100 per cent sulphuric acid, which is not far short of 10 per cent of the country's requirements.

Disposal of cement clinker, which is a major subsidiary product of this method of making sulphuric acid, will be arranged by an agreement with the Associated Portland Cement Company, which is building a new cement works at Widnes.

Anhydrite, the raw material, will be supplied by the British Plaster Board Company, from a new mine in Scotland. Some 240,000 tons a year will be required.

In view of the scarcity of sulphur and sulphuric acid the project is to receive full support of the Government in securing all the necessary priorities for materials and other resources.

The companies participating in the scheme and their respective annual quotas of acid, are:—

	Tonnage 100% acid
Alumina Co.	4,500
British Celanese	5,500
British Enka	10,000
Clayton Aniline	13,500
Courtaulds	20,000
Fisons	35,000
I.C.I.	35,000
J. H. Dennis	6,000
McKechnie Bros.	6,000
T. Bolton	9,000
Transparent Paper	3,500
	148,000

These 11 participants will subscribe the ordinary capital of £1,200,000, according to their offtake of acid, and £3 million of five to 20-year 4½ per cent debenture stock has been placed with institutional investors by Hoare and Co., of Crosby Square. Both the ordinary shares and debenture stock will be privately held. It is not intended to apply for Stock Exchange quotation.

Quotas of sulphuric acid will be purchased by the participating companies from the beginning of commercial production up to at least 1970, at such a price that all production costs, depreciation, financial charges, and interest and annual repayment of the debenture stock will be covered. They have also agreed to subscribe further ordinary capital up to an amount of £1,200,000 (making a maximum of £2,400,000) to meet excess overall capital costs over the estimate and to meet certain liabilities of the corporation including principal and interest on the loan capital.

Debenture stock will be further secured by a first mortgage on the site to be acquired by the corporation at Widnes and the building and fixed plant to be erected on it.

Economic prospects for the company should be favourable. The days when the world's requirements of sulphur could be supplied from Texas at about £6 a ton have gone for good. The Widnes project should have a reasonable proposition at an equivalent price of £12 a ton which would compare well with the present American price of £16 10s. to £17 a ton, and which it is probable will increase still further.

F. C. G. Fison Chairman

The board of the United Sulphuric Acid Corporation is composed of Mr. F. C. G. Fison (chairman), Mr. S. P. Chambers, financial director of Imperial Chemical Industries, Mr. A. Davenhill, director and general manager of British Enka, Mr. J. H. Dennis, chairman of James H. Dennis and Co., Mr. R. A. Kinnes, director of Courtaulds, and Mr. T. M. Wilcox, director of Clayton Aniline Co.

Chemical & Allied Stocks & Shares

THE confusion in stock markets and the heavy fall in industrial share values which were the immediate outcome of the Gaitskell dividend limitation plan have given way to a general rally that made good the greater part of earlier losses. This has been one of the most spectacular recoveries shown on the Stock Exchange over a short period. It is all the more remarkable because the Chancellor's proposals were more drastic than had been generally expected. They mean that the great majority of companies will have to pay less next year, as future dividends will be limited to the average of payments made in the two last accounting periods before the Chancellor's dividend speech at the end of July. Numerous companies raised their dividends in the last nine months when the previous dividend limitation plan—Sir Stafford Cripp's request to restrict payments—was being gradually relaxed. Now companies which have paid more will have to make reductions next year—if the Gaitskell plan becomes law.

Bill May Not Go Through

The stock market rally has been due in part to the view that the Dividend Control Bill may never go on the statute book because a General Election may prevent this. Moreover, it is being pointed out in the market that numerous shares still offer not unsatisfactory yields on the basis of the reduced dividends resulting from the Gaitskell 'freeze,' and that in any case, the latter is unlikely to last for the three year period envisaged by the Chancellor.

Already some companies are placing to special dividend reserves a part of annual profits for distribution to shareholders when limitation ends. There is, of course, still a good deal of confusion. It is not known whether companies which have made tax free payments from investment sales and other capital profits will be able to include these in calculating their maximum dividends permitted under the Gaitskell plan. Moreover, there is some uncertainty whether companies out of the dividend list will be able to restart with only 5 per cent, or will have as a maximum the average of the payments made in the last two accounting periods when they were in the dividend list.

As was to be expected, shares of chemical and kindred companies have moved fairly closely with the general trend in industrials. The big set-back which resulted from the Chancellor's speech at the end of July was followed by a sharp rally which recovered the greater part of the fall. Imperial Chemical, which were down to 49s. just after the Chancellor's speech at the end of July, have now rallied to 50s. 6d. The I.C.I. dividend under the Gaitskell plan will be reduced from 12 per cent to 11 per cent. Monsanto will not be able to pay more than 50 per cent, against last year's 55 per cent; but the 5s. shares have rallied to 26s. 3d. which compares with 23s. 9d. at the end of July. Fisons, however, would be able to pay 10½ per cent against last year's 9 per cent, profits permitting; the shares are now 31s. 3d. compared with 29s. at the end of July. At the time of writing, Albright & Wilson at 21s., have been quite well maintained on balance, Boake Roberts have strengthened to 18s. 6d. on the full results. Laporte 5s. shares firmed up to 11s. 6d. and British Glues & Chemicals to 28s. 3d. F. W. Berk were 6s. 7½d., Amber Chemical 2s. shares 4s., Brotherton 23s. 9d., and Hardman & Holden 27s. 9d. Lever & Unilever strengthened to 53s. 3d., Turner & Newall to 95s. 9d. and the 4s. units of the Distillers Co. at 22s. 6d. regained most of an earlier decline. Oils were generally better on balance although Anglo-Iranian at £5½ lost part of their rally, latest news from Persia affecting sentiment.

Plentiful Cortisone

EASIER supplies of cortisone are expected as the result of investigations by Merck and Co., Inc., Rahway, New Jersey, which have led to the completion of the jump from 3-acetoxy-11, 20-diketoallopregnane to cortisone. This route starts from such plentiful, naturally occurring steroids as cholesterol, stigmasterol, ergosterol, or diosgenin.

Further improvement of the Merck synthesis is expected, particularly after it has been adapted to plant-scale operation. Yields are expected to be better than those of the present bile acids process, as the new route involves only about 20 stages.

Commercial Intelligence

New Registrations

A. M. Garden, Ltd.

Private company. (498,482). Capital £1,600. Manufacturers of and dealers in all kinds of chemical, industrial and other preparations, etc. Subscribers: Mrs. M. Garden, D. F. Byrne. Reg. office: 164 London Road, Mitcham, Surrey.

Pharmachem Products, Ltd.

Private company. (498,510). Capital £100. Manufacturing chemists, etc. Directors: A. S. Herd and J. Rimmer. Solicitors: Bird & Lovibond, Uxbridge, Mdx.

Habeeb and Son (London), Ltd.

Private company. (498,535). Capital £250. Importers and exporters of, and dealers in merchandise; agents, oil and chemical brokers, merchants and factors, manufacturing chemists, etc. Directors: P. T. Murphy and A. Habeeb. Secretary: J. M. Murphy, 204 Lordship Lane, S.E.22.

Increases of Capital

The following increases of capital have been announced:—BERTRAM GRIFFITHS DRUF & CHEMICAL CO., LTD., from £250 to £5,000; MIDLAND SILICONES, LTD., from £100 to £20,000.

Company News

A. Boake Roberts & Co., Ltd.

Expansion of home and overseas trade by 30 and 41 per cent in value is revealed in the statement of Mr. E. J. Boake, chairman of A. Boake Roberts & Co., Ltd., for the year ended 31 March, 1951. Continued rise in cost of nearly all commodities is a matter of concern and £300,000 for taxation has to be found during the current year. Steps are nearly completed to capitalise £237,500 of the reserve funds. The meeting will be held at 16 Berkeley Street, London, W.1, on 11 September.

Indian Copper Corporation

What may well be a long-term project of considerable importance is announced by Sir Godfrey Fell, chairman of the Indian Copper Corporation, in his survey of the year ended 31 December, 1950. An expert is visiting Moubhandar and the question of the possibility of recovering sulphur products from the roaster and smelter gases is being reconsidered. Sales of kyanite reached a total of 23,717 tons, but exports from India have now been curtailed. Net profits were £63,000 after increased reserve allocation and higher taxation requirement. The dividend was maintained at 12½ per cent. The meeting of the company will be at 20 Aldermanbury, London, E.C., on 12 September.

FBI Students Brains Trust

MORE than 60 overseas students who are spending their vacation in engineering and other works in the London area attended a Brains Trust organised by the FBI and held at Church House on 17 August.

Members of the Brains Trust were: Mr. E. W. Goodale, C.B.E., M.C., a vice-president of the FBI and a director of Warner & Sons, Ltd. (Brains Trust chairman); Mr. W. L. Boon, managing director of Powell Duffryn Technical Services, Ltd.; Major-General C. Lloyd, director, City and Guilds of London Institute; Mr. R. K. Sanders, research director, the Metal Box Co., Ltd., and Mr. Bertram White, technical director, FBI.

Among questions put by the students, who are at work in this country under the auspices of the International Association for the Exchange of Students for Technical Experience, were: Why does Britain not adopt the metric system? What is the future of the small firm in a modern industrial economy? What is thought of the training and education of technologists in Britain? When is it expected that atomic energy stations will be producing electric power in Britain?

MR. I. S. HORABIN has been appointed sales manager of Scottish Mechanical Light Industries, Ltd., to implement its bulk distributing policy and extend arrangements with overseas territories. MR. J. A. CULLEY has been made liaison officer to Scot Mec dealers.

To mark his 30 years' service as a colour chemist with John W. Leitch & Co., Ltd., MR. J. A. WALLWORK, A.R.I.C., was recently presented with a grandmother clock by DR. A. E. EVEREST, managing director.

British Chemical Prices

LONDON.—Brisk trading conditions in all sections of the industrial chemical market have been reported during the past week and buying interest both for spot and forward delivery has been sustained. The demand for export, chiefly for Empire destinations has also been well up to the average for the past few months. Prices are again very firm with no important changes to record. The position of the coal tar products remains tight with new delivery parcels unobtainable. Pitch is in good request at the higher price of 130s. per ton.

MANCHESTER.—Actual price movements on the Manchester market for heavy chemical products during the past week have been of little importance, but the undertone remains strong in almost all sections. Home-trade users are taking steady deliveries of the soda compounds and other bread-and-butter lines under contracts, and a fair number of new inquiries have been in the market during the past few days. A sustained demand on export account is also reported. Business in fertilisers is on the slow side, but in the tar products there is pressure for supplies of most of the light and heavy materials.

GLASGOW.—There have been no outstanding changes in the general position. The recent increases in the price of zinc and manganese are now beginning to make themselves felt with higher prices being asked for the derivatives. Generally speaking, manufacturers are facing the same difficulties with regard to shortages but, taking everything into consideration, trade on the whole is quite good.

With regard to export, the main problem here is the lack of suitable packages especially for liquids and there does not seem to be any immediate prospect of this position bettering itself.

General Chemicals

Acetic Acid.—Per ton : 80% technical, 1 ton, £110 ; 80% pure, 1 ton, £116 ; commercial glacial 1 ton, £129 ; delivered buyers' premises in returnable barrels ; in glass carboys, £7 ; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £166 per ton.

Acetone.—Small lots : 5 gal. drums, £105 per ton ; 10 gal. drums, £100 per ton. In 40/50 gal. drums less than 1 ton, £85 per ton ; 1 to 9 tons, £109 per ton ; 10 to 50 tons, £108 per ton ; 50 tons and over, £107 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 4s. 7½d. per proof gallon ; 5000 gal. lots, d/d, 4s. 8½d. per proof gal.

Alcohol, Diacetone.—Small lots : 5 gal. drums, £133 per ton ; 10 gal. drums, £128 per ton. In 40/45 gal. drums : less than 1 ton, £113 per ton ; 1 to 9 tons, £112 per ton ; 10 to 50 tons, £111 per ton ; 50 to 100 tons, £110 per ton ; 100 tons and over, £109 per ton.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER : Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER : £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non-returnable drums ; 1 ton lots £47 per ton.

Ammonium Chloride. — Grey galvanising, £27 10s. per ton, in casks, ex wharf. Fine white 98%, £21 10s. to £22 10s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate. — MANCHESTER : £5 15s. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £88 and £86 10s. per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots as to grade, etc., 2s. 7d. to 3s. 8½d. per lb. Crimson, 4s. 1d., to 5s. 6d. per lb.

Arsenic.—Per ton, £44 5s. to £47 5s., ex store.

Barium Carbonate.—Precip., d/d ; 2-ton lots, £30 per ton, bag packing.

Barium Chloride.—£40 10s. 2 ton lots d/d bags.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £33 5s. per ton d/d ; 2-ton lots, £33 10s. per ton d/d.

Bleaching Powder.—£19 10s. per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140-lb. bags, carriage paid: Anhydrous, £59 10s.; in 1-cwt. bags; commercial, granular, £39 10s.; crystal, £42; powder, £43; extra fine powder, £44; B.P., granular, £48 10s.; crystal, £51; powder, £52; extra fine powder £53.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granular, £68; crystal, £76; powder, £73 10s.; extra fine powder, £75 10s.; B.P., granular, £81; crystal, £88; powder, £85 10s.; extra fine powder, £87 10s.

Butyl Acetate BSS.—£263 per ton, in 10-ton lots.

Butyl Alcohol BSS.—£250 per ton, in 10-ton lots.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid £9 12s. 6d. per ton, in 4-ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 6d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Per lb., d/d buyers' premises, for 5 cwt. or over, anhydrous, 1s. 9d. plus 10%, other, 1s. 9d.; 1 to 5 cwt., anhydrous 1s. 9½d. plus 10%, other 1s. 9½d. Higher prices for smaller quantities. All subject to a trade discount of 5%.

Cobalt Oxide.—Black, delivered, 11s. 2d. per lb.

Copper Carbonate.—MANCHESTER: 2s. 6d. per lb.

Copper Chloride.—(63%), d/d, 2s. 9d. per lb.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(63%), d/d, 2s. 8d. per lb.

Copper Sulphate.—£97 2s. 6d. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £12 12s. d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £174 per ton.

Formaldehyde.—£33 per ton in casks, according to quantity, d/d.

Formic Acid.—85%, £66 to £67 10s. per ton, carriage paid.

Glycerin.—Chemically pure, double distilled 1,260 s.g. £14 9s. 0d. per cwt.
Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 3d. to 2s. 6d. per lb.; bulk carriage paid.

Hydrochloric Acid.—Spot, 9s. 6d. to 10s. 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—27.5% wt. £116 per ton. 35% wt. £146 per ton d/d. Carboys extra and returnable.

Iodine.—Resublimed B.P., 21s. 4d. per lb. in cwt. lots.

Iodoform.—24s. 9d. per lb. in cwt. lots.

Iron Sulphate.—F.O.R. works, £3 15s. to £4 5s. per ton. Bags free.

Lactic Acid.—Pale tech., 44 per cent by weight £130 per ton; dark tech., 44 per cent by by weight £110 per ton ex works; Usual container terms.

Lead Acetate.—White: £194 10s. per ton.

Lead Carbonate.—Nominal.

Lead Nitrate.—£161 10s. per ton.

Lead, Red.—Basis prices per ton: Genuine dry red lead, £198; orange lead, £210. Ground in oil: red, £219; orange, £231.

Lead, White.—Basis prices: Dry English, in 8-cwt. casks, £204 per ton. Ground in oil: English, under 2 tons, £220.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82%, ton lots, d/d, £22 to £25 per ton.

Litharge.—£198 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light, commercial, d/d, £87 15s.; cwt. lots £97 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light, commercial, d/d, £221; cwt. lots £227 10s. per ton d/d.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 10s. 8d.; smaller quantities dearer.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 4s. 2d. per gal. ; pyridinised 64° O.P. 100 gal., 4s. 4d. per gal.

Nickel Sulphate.—Deld. buyers U.K. £140 10s. per ton.

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—About £146 per ton, packed in 5-cwt. lots, packed in free 5-cwt. casks.

Paraffin Wax.—Minimum 1-ton lots £76 5s. ; smaller quantities £77.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £67 per ton ; B.P. (S.G. 1.750), ton lots, carriage paid, 1s. 2½d. per lb.

Potash, Caustic.—Solid, £88 10s. per ton for 1-ton lots ; flake, £105 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate.—Crystals and granular, 10¾d. per lb. ; ground, 11¾d. per lb., for not less than 6 cwt. ; 1-cwt. lots, ¼d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £88 10s. per ton for 1-ton lots, ex store ; hydrated, £81 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96%, 6-ton lots, £16 10s. per ton.

Potassium Iodide.—B.P., 18s. 5d. per lb. in 28 lb. lots.

Potassium Nitrate.—Small granular crystals, 81s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots ; for 3 cwt. and upwards, 1s. 6½d. per lb. ; technical, £8 3s. per cwt. ; for 5 cwt. lots.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—Dog-tooth crystals, £72 10s. per ton ; medium, £67 10s. per ton ; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid. — MANCHESTER : Technical 2s. 7d. to 2s. 10d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic.—Solid 76/77% ; spot, £21 12s. 6d. per ton d/d. (4 ton lots).

Sodium Acetate.—£85 to £91 per ton d/d.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 9d. per lb. ; anhydrous, 9¼d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite.—Powder, 60/62%, £40 per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt free bags.

Sodium Chlorate.—£87 to £95 per ton.

Sodium Cyanide.—100% basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals £28 a ton ; commercial, 1-ton lots, £26 per ton carriage paid.

Sodium Iodide.—B.P., 19s. 8d. per lb., in 28 lb. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £114 ton.

Sodium Metasilicate.—£19 to £19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98%, 6-ton lots, d/d station, £29 15s. per ton.

Sodium Nitrite.—£29 12s. 6d. per ton.

Sodium Percarbonate.—12½% available oxygen, £8 4s. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots : Di-sodium, crystalline, £34 10s., anhydrous, £73 ; tri-sodium, crystalline, £36 10s., anhydrous, £70.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER : £6 10s. per ton d/d station.

Sodium Sulphide.—Solid, 60/62%, spot. £27 per ton, d/d, in drums ; broken, £27 15s. per ton, d/d, in drums.

Sodium Sulphite.—Anhydrous, £57 12s. 6d. per ton ; pea crystals, £35 7s. 6d. per ton d/d station in kegs ; commercial, £22 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £20 4s. 6d. to £22 9s. 6d. according to fineness.

Tartaric Acid.—Per cwt. : 10 cwt. or more, £15.

Tin Oxide.—1-cwt. lots d/d £25 10s. (Nominal.)

Titanium Oxide.—Comm., ton lots, d/d (56-lb./112 lb. bags), £115 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d ; white seal, £207 10s. ; green seal, £206 10s. ; red seal, £205.

Zinc Sulphate.—Nominal.

Rubber Chemicals

Antimony Sulphide.—Golden, 2s. 6¼d. to 3s. 8d. per lb. Crimson, 3s. 6¾d. to 4s. 9¾d. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Off colour, ex store. Imported £13 10s per ton. Extra white bleached ex store, £16.

Cadmium Sulphide.—About 20s. per lb.

Carbon Bisulphide.—£65 5s. per ton, according to quality.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£67 10s. per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 1s. 9½d. to 2s. 3d. per lb. ; dark, 1s. 8½d. to 2s. 1¾d. per lb.

Lithopone.—30%, £62 10s. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £15 4s. 6d.

Compound Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. Special No. 1, £25 14s. 6d.

"Nitro-Chalk."—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean agricultural for 6-ton lots d/d nearest station, £29 15s. per ton.

Coal-Tar Products

Benzol.—Per gal, ex works : 90's, 3s. 8½d. ; pure, 3s. 11½d. ; nitration grade, 4s. 2½d.

Carbolic Acid.—Crystals, 1s. 6d. to 1s. 8d. per lb. Crude, 60's, 8s. MANCHESTER : Crystals, 1s. 6½d. to 1s. 8d. per lb., d/d crude, 5s. 9d., naked, at works.

Creosote.—Home trade, 8d. to 10½d. per gal., according to quality, f.o.r. maker's works. MANCHESTER : 7¾d. to 10d. per gal.

Cresylic Acid.—Pale 98%, 5s. 8d. per gal. ; 99.5/100%, 6s. American, duty free, for export, 10s. naked at works.

Naphtha.—Solvent, 90/160°, 4s. 2½d. per gal. for 1000-gal. lots ; heavy, 90/190°, 3s. 8d. per gal. for 1000-gal. lots, d/d. Drums extra : higher prices for smaller lots.

Naphthalene.—Crude, ton lots, in sellers' bags, £18 2s. 3d. to £29 5s. 9d. per ton according to m.p. ; hot-pressed, £50 to £60 per ton, in bulk ex works ; purified crystals, £60 to £70 per ton. F.O.B.

Pitch.—Medium, soft, home trade, 130s. per ton f.o.r. suppliers' works ; export trade, 135s. per ton f.o.b. suppliers' port. MANCHESTER : £7 10s. f.o.r.

Pyridine.—90/160°, 27s. 6d. per gal. MANCHESTER : 30s. to 35s. per gal.

Toluol.—Pure, 4s. 7½d. per gal. MANCHESTER : Pure, 4s. 7½d. per gal. naked.

Xylol.—For 1000-gal. lots, 5s. 1½d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton ; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal. ; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediate and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—3s. 9d. per lb. d/d.

o-**Cresol** 30/31° C.—1s. per lb. d/d.

p-**Cresol** 34/35° C.—3s. 9d. per lb. d/d.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb. ; 66/68° C., 1s.

p-**Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb. ; P.G. 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

PERSONAL

R. H. Windsor Ltd., the manufacturers of injection moulding and extrusion machines for the plastics industry, have sent two of their leading executives and an associate inventor across the Atlantic by air for an intensive series of visits to American customers to provide an on-the-spot technical advisory panel. They are MR. E. G. FISHER, M.P.S., chief of extrusion development, MR. S. SMITH, the firm's chief engineer, and MR. ROBERTO COLOMBO, the well-known Italian inventor of a multi-screw extrusion machine now exclusively manufactured by R. H. Windsor Ltd., at their Chessington factory.

Mr. Fisher, himself an inventor of a number of plastics and engineering patents registered in his name, will go on from the U.S.A. to Australia, New Zealand and Japan, following in the footsteps of MR. R. E. G. WINDSOR, his young managing director who this year himself paved the way with a 40,000 mile, seven-week air trip round the world.

Among the four internationally distinguished chemists who will present special scientific lectures at the World Chemical Conclave in New York next month is DR. E. W. R. STEACIE, vice-president of Canada's National Research Council and last year's president of the Chemical Institute of Canada. The doctor who was educated at McGill University, was responsible during the last war for the organisation and administration of the Canadian atomic energy project. He has made a special study of chemical kinetics, gas reactions and photochemistry. In particular he has investigated the chemical behaviour of gaseous hydrocarbons and the photosensitised reactions involving cadmium and mercury. The subject of the doctor's address to the conclave will be 'The Mechanism of Gas-phase Decomposition.'

MR. J. L. S. STEEL, formerly overseas director, has been appointed to take charge of the heavy chemical group of I.C.I. Headquarters of two of the four divisions in the group are in Liverpool. Mr. Steel recently became chairman of the British Committee of the International Chamber of Commerce.

Obituary

The death occurred on 9 August of MR. ARTHUR CHESTER SIMPSON, a former director of the Bradford Dyers' Association, at the age of 67. He joined the BDA as a boy at the William Aykroyd branch in 1898, and became in time works manager at J. and M. S. Sharp & Co., Ltd., Heckmondwike. He was elected a director of the BDA in 1932 and three years later took charge of the Whitaker and Aykroyd's branch, retiring on 31 December, 1946.

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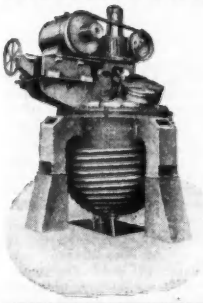
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CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

UNIVERSITY OF MANCHESTER
The next session commences on Thursday, 4th October, 1951.

SITUATIONS VACANT

ASSISTANT EXPERIMENTAL OFFICERS (INCLUDING BIOLOGISTS) in various Government departments. The Civil Service Commissioners invite applications for permanent appointments. Interviews will be held shortly after the receipt of the completed application form and successful candidates may expect early appointments.

The posts are in various Government Departments and divided between following main groups and subjects: (a) Mathematical and Physical Sciences; (b) Chemistry and Metallurgy; (c) Engineering Subjects; and (d) Miscellaneous (including, e.g. Geology, Library and Technical Information Services). A few vacancies have now arisen for Biologists interested in pest infestation control, forensic science, fisheries problems or botany, and there may be one or two posts for biologists with other interests.

Candidates must be at least 17½ years and under 26 years of age (or under 31 for established Civil Servants of the Assistant (Scientific) Class) on 1st August, 1950; time spent on a regular engagement in H.M. Forces may be deducted from actual age. Candidates must have obtained the Higher School Certificate with mathematics or a science subject as a principal subject, or an equivalent qualification; but candidates without such qualifications may be admitted exceptionally on evidence of suitable experience. Higher qualifications will be regarded as an advantage to candidates over the age of 20.

The inclusive London salary scale (men) is £250-£535; (women) £250-£445. Salaries for posts in the provinces are somewhat lower. Superannuation provision is made under the Superannuation Act.

Further particulars and forms of application from the **Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1,** quoting No. 3068.

Completed application forms should be returned as soon as possible and must in any case be received not later than 1st October, 1951.
11722/150/WP.

OIL Refinery Contractors handling large contracts for refinery plant require **CONTRACTS ENGINEERS** in their London office. Duties involve broad direction and co-ordination of all phases of the work, including planning, drafting, purchasing, progressing and erection. Desirable qualification is previous experience, including a wide knowledge of pumping, heat exchange equipment and instrumentation, and the appointments offer excellent prospects to suitable men. Applicants should write fully, stating qualifications, age and experience to **Foster Wheeler, Ltd., 3 Ixworth Place, London, S.W.3.**

WORKS CHEMIST, age about 40, good experience handling men and materials. Southern counties, housing accommodation available. State qualifications, experience and salary required. Box No. C.A. 3037, THE CHEMICAL AGE, 154 Fleet Street, London, E.C.4.

SITUATIONS VACANT

SENIOR SCIENTIFIC OFFICERS; SCIENTIFIC OFFICERS. The Civil Service Commissioners invite applications for permanent appointments to be filled by competitive interview during 1951. Interviews began in January and will continue throughout the year, but a closing date for the receipt of applications earlier than December, 1951 may eventually be announced. Successful candidates may be appointed immediately. The posts are in various Government Departments and cover a wide range of Scientific research and development in most of the major fields of fundamental and applied science. Candidates must have obtained a university degree with first or second class honours in a scientific subject (including engineering) or in Mathematics, or an equivalent qualification, or possess high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experience. Candidates for Scientific Officer posts taking their degrees in 1951 may be admitted to compete before the result of their degree examination is known.

Age limits: For Senior Scientific Officers, at least 26 and under 31 on 1st August, 1951; for Scientific Officers, at least 21 and under 28 (or under 31 for established civil servants of the Experimental Officer class) on 1st August, 1951. London Salary Scales: Senior Scientific Officers, (men) £750-£950; (women) £625-£850. Scientific Officers (men) £400-£650; (women) £400-£525. Somewhat lower rates in provinces.

Further particulars from: **the Secretary, Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1,** quoting No. 3399.
12233/120/WP.

FOR SALE

600

HORIZONTAL single trough **STEAM JACKETED MIXER** by Scott. 14 in. long by 4 ft. 6 in. deep with 4 ft. 6 in. wide. Of rivetted M.S. W.P. 50 lb. sq. in. T.E. with 24 in. by 18 in. manhole in cover. F. and L. pulley drive through worm gearing.

Totally encl. **MIXER,** approx. 6 ft. int. diam. by 6 ft. deep on straight, 3 ft. hemispherical bottom. Domed cover. 6 in., 4 in., 3 in., 2 in. and 1½ in. connections to cover, with 18 in. diam. hinged manway. Three 2 in. connections in side, and 5 in. and 3 in. bottom outlets. F. and L. pulley drive.

S. J. VACUUM MIXER by Bartle. Int. dimens. 3 ft. 6 in. by 2 ft. 6 in. by 3 ft. 3 in. Perf. paddle type agitators fitted to 2½ in. diam. shaft. 1 in. bottom outlets at each end. Close fitting lid, bolted. F. and L. pulley drive

Baker Perkins trough tilting **MIXER.** Alloy trough 20 in. by 14 in. by 17 in. deep with cover Gunmetal gate type Agitators. F. and L. pulley drive.

42 in. diam. **HYDRO EXTRACTOR** by Manlove Alliott. Self balancing, solid -mounted type. Copper basket 15 in. deep, ¼ in. perfs. Belt driven. 7-h.p. required to drive.

Pfaudler Blue Glass lined **EVAPORATING PAN** 36 in. diam. by 11 in. deep. Welded construction. Steam jacketed. W.P. 30 lb. sq. in.

Lead lined **STORAGE TANK** 9 ft. diam. by 35 ft. long. Of welded M.S. plate, with 18 in. diam. manhole. Two 4 in. and one 3 in. flanged connections.

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VARIOUS MIXERS FOR SALE

BAND CONVEYOR, 50 ft. long 40 in. wide, steel frame motorised, for boxes, cases, bags, etc.

Two FILTER PRESSES fitted with wood plates and frames, washing type.

Two FILTER PRESSES, chamber type, steam heated, centre fed with separate outlet taps.

14 various open top **STORAGE TANKS**, riveted capacities from 300 gallons to 9,800 gallons, last used for oil or varnish.

1½, 2½ and **3½** size belt-driven **DISINTEGRATORS** by Christy & Norris or Harrison Carter.

Size No. 3 Junior Hammamac **HAMMER MILL** with fan and cyclone, also No. 1 size Miracle **GRINDING MILLS** and one size 3W Miracle **GRINDING MILL.**

Robinson 3-sheet No. 1 size **CENTRIFUGAL DRESSING MACHINE** for dry powders, etc.

Gardner Size "G" **RAPID SIFTER** and **MIXER**, belt and gear driven.

Two Gardner **RAPID MIXERS** only, 40 in. long, 14 in. wide, one provided with small separate A.C. Motor.

Four ROTARY BOWL MIXERS, 5 ft. diam., cast iron built, inclined agitators, by Baker Perkins.

One Broadbent under-driven **HYDRO EXTRACTOR** self-balancing type, with self-contained A.C motor.

Two FILTER PRESSES, fitted recessed C.I. plates, 40 in square, 2½ in. thick, centre fed, to make 11 cakes per Press.

Kek GRINDING MILL, square pin type, with grinding discs 13 in. diam., including circular delivery bin with single outlet.

Large unjacketed **WERNER MIXER**, belt and gear driven, hand tipping, double "Z" arms, pans 53 in by 45 in by 36 in. deep.

No. 200 One nearly new **WERNER PFLEIDERER JACKETED MIXER OR INCOPORATOR.** Low type, with C.I. built mixing chamber, 28 in. by 29 in. by 27 in. deep, with double "U"-shaped bottom which is jacketed, and double fish-tail or fin-type agitators geared together at one side, with belt-driven friction pulleys, 34 in. diam. by 5 in. face, with hand-wheel operation and hand-operated screw tilting gear. Machine fitted with machine-cut gears covers, gear guard, cast-iron baseplate, and measuring overall approximately 7 ft. by 6 ft. by 4 ft. high to the to of the tipping screw.

No. 209 One **HORIZONTAL "U"-SHAPED MIXER** steel built, riveted, measuring about 8 ft. 3 in. long by 3 ft. wide by 3 ft. 3 in. deep, with horizontal shaft, fitted with bolted-on mixing arms about 18 in. long by 4 in. wide, with intermediate breakers, and driven at one end by a pair of spur gears, with countershaft, fast and loose belt pulleys, outer bearing and plug cock type outlet at the opposite end, mounted on two cradles fitted to two R.S.J. running from end to end.

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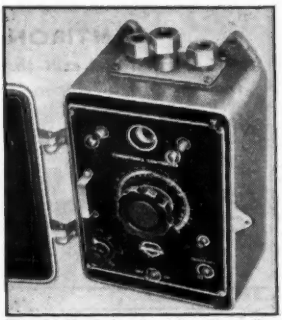

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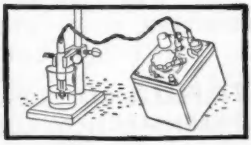

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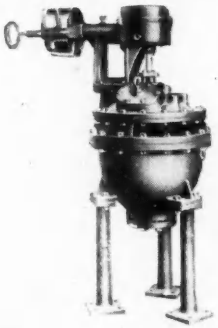

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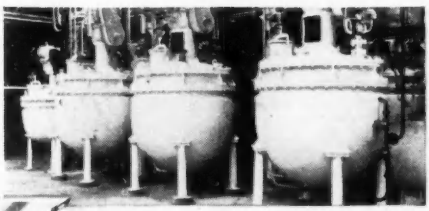

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